

# MOTOR AGE

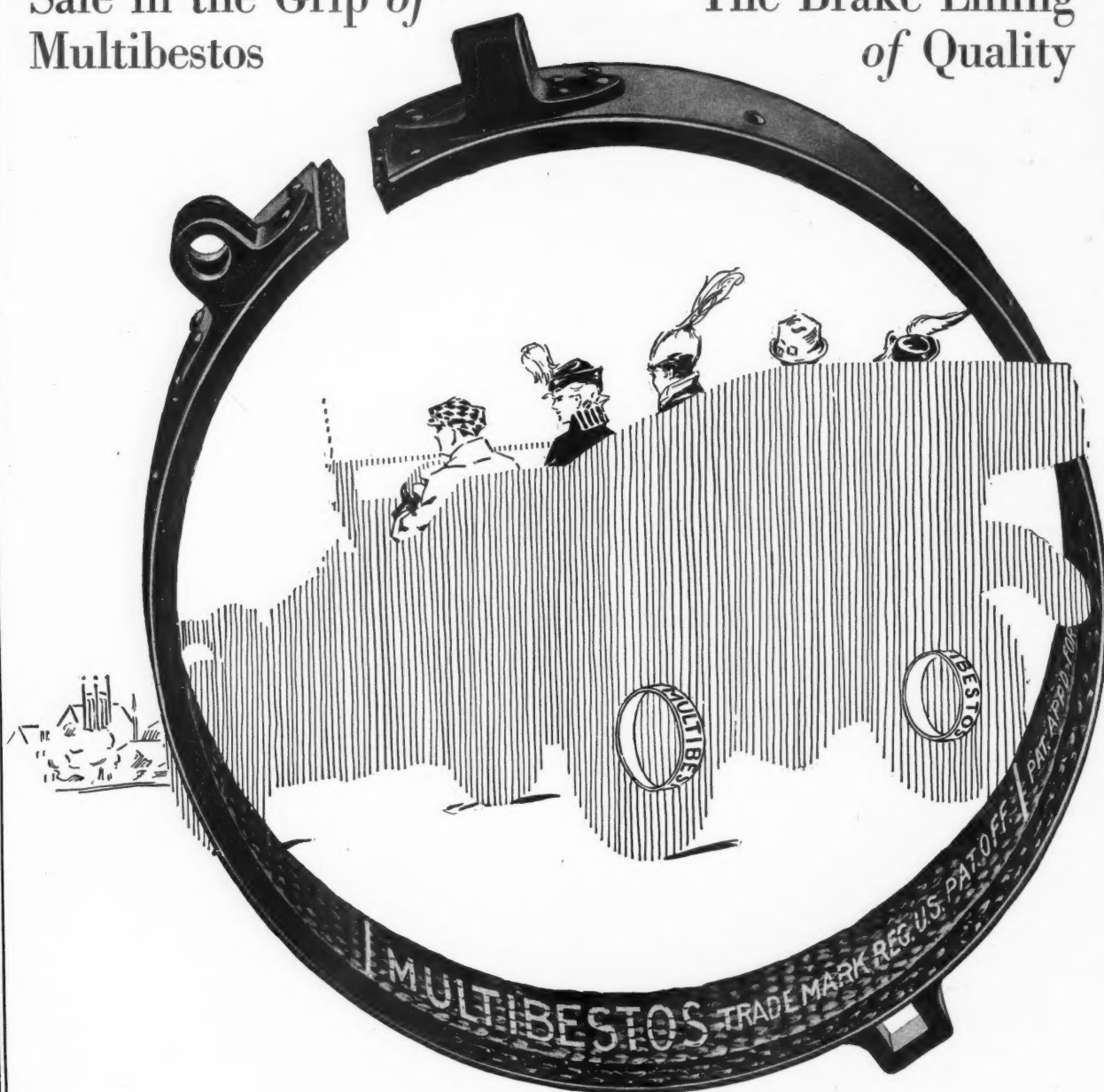


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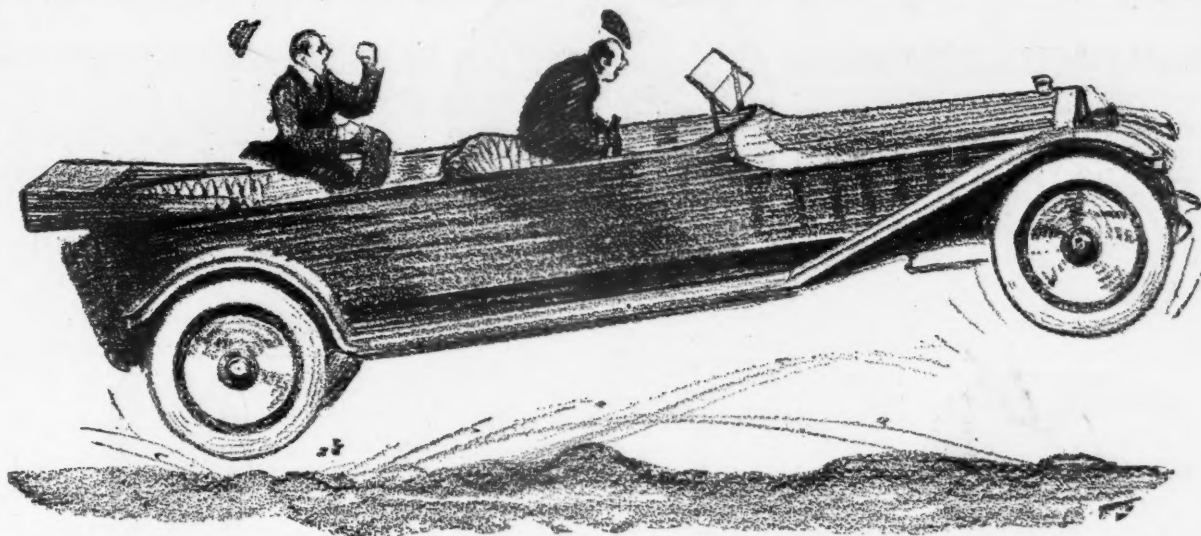
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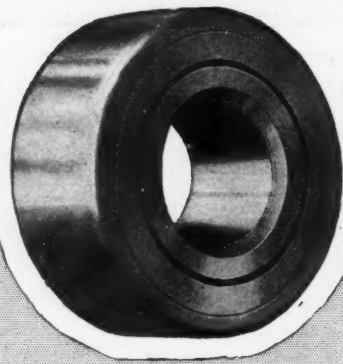


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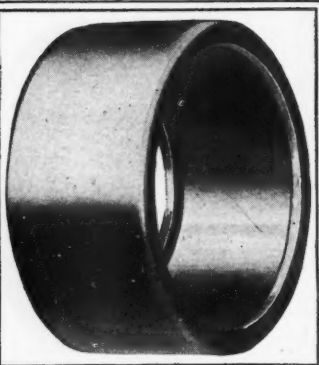
## NEW DEPARTURE

American Made

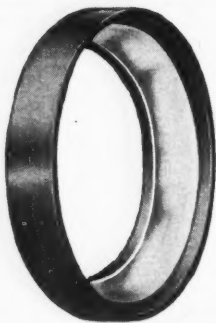


## BALL BEARINGS

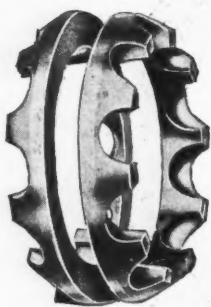
for American Trade



Outer Shell



Cup

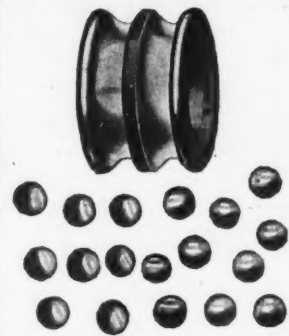


Separator

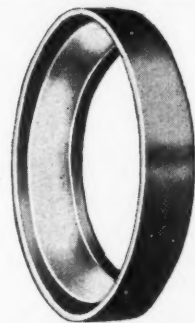
Of the Four Types of New Departures, the Double Row shown here in complete detail, is a triple purpose, self contained unit designed and patented by this company.

So well has it served its purpose in practical use, that many unsuccessful attempts have been made to imitate it.

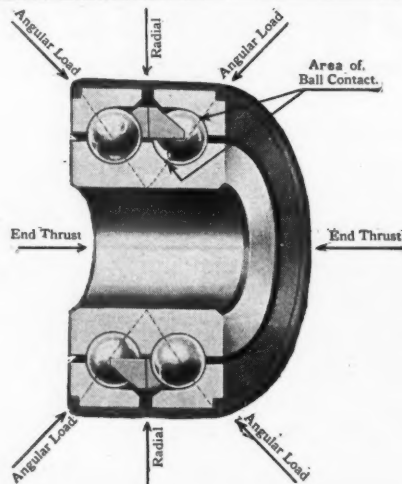
The adaptability, economy, quality and efficiency of this Double Row Bearing make it the best possible bearing for use in 85% of all places where Ball Bearings can be installed.



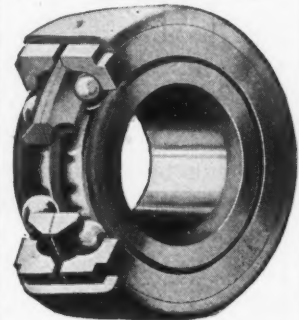
Cone and Balls



Cup



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Sectional View

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# MOTOR AGE



Published by the  
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910 South Michigan Avenue  
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Volume XXVII

April 15, 1915

No. 15

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## Authority

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# MOTOR AGE



## *The Plain English of Motor Car Insurance*

By Darwin S. Hatch

COMIC supplements to the contrary, motor cars usually are not considered as a liability by their owners. Nevertheless, no matter how highly the enthusiastic motorist may regard his car, it is a liability, unless it is covered by insurance of several different kinds. At least, it is so considered in financial circles.

When one goes to a bank to borrow money, he is quite likely to be asked as to whether or not he owns a motor car

and the next question almost invariably is, is it insured? If the car is not covered by a sufficient array of insurance policies, the financial expert in all probability will point out that the machine is not the monetary asset it fondly was imagined to be, but on the contrary is a menace to the pocketbook. The banker will inform you that there is a possible chance of your killing or permanently injuring some one and being forced to pay \$10,000 or \$20,000 in damages. Then there is the chance of loss of the car by fire or theft.

### **Uninsured Car a Liability**

If the banker refuses to assume the risk of financial loss through accident to or destruction of another's car, it seems reasonable to suppose that the motorist himself who probably can less afford the loss should likewise be protected. Motor car insurance is a safeguard to the owner's pocketbook that is well worth the annual premium it costs.

About three-quarters of those who own cars have them covered by insurance of one sort or another, but few of them really know what their protection comprises, under what conditions they may recover for loss, or what must be done in case of fire, accident or theft if they are to be protected with the least inconvenience and delay.

There are five kinds of insurance for motor cars and when the owner has covered his car with all of these he will find that he is secured from financial loss, no matter what may happen to the car. These are known as fire, theft, liability, property damage, and collision insurance and each kind covers a distinct class of losses. Ordinarily fire and theft insurance is covered in the same policy, so in practice there are only four kinds to be considered.

Fire and theft insurance reimburses the policy holder for either complete or partial

loss from fires arising from any cause, whatsoever, in the garage or any other building, on the road, in a railroad car or any other conveyance, ferry or inland steamer, anywhere within the limits of the United States and Canada, except Alaska, the Hawaiian Islands and Porto Rico.

#### Can Keep Car Anywhere

This gives a wide range of travel for the car without getting out of the limits covered by the policy. In fact, as one insurance man put it, "You could keep your car in a powder magazine if you wanted to and the policy still would hold good." The chances are, however, that if the insurance agent knew that a powder magazine were your accustomed garage, you would have difficulty in convincing the company that your car was a good fire risk and might find that it would refuse to write the policy for you. On the other hand, it might be assumed that a car stored alongside explosives would be a pretty safe risk as regards theft.

Insurance which covers the car anywhere in the United States and Canada is what is known as a "floater policy." Floater policies may be obtained for any of the kinds of insurance—fire, theft, liability, collision and property damage. If the car is to be kept in one place for a long time, the insurance can be limited to this one spot, with a considerable reduction in the premium. It need not be

said, however, that non-floater policies are of little value except as protection against fire and theft, as there is small chance of other accidents happening when the car does not leave a certain spot.

As to what the fire and theft policy covers, the holder of such a policy is protected from loss by fire from any cause whatsoever; backfire through the carbureter, lightning, garage fires, shorted electric wires—even gross carelessness with matches around the gasoline tank. The only case in which there is no protection is where it can be proven that the loss was intentional.

#### Two Exceptions Cited

It also includes loss or damage of the car itself or any part of its equipment as the result of burglary or theft and also covers loss or damage during transportation if the car is in the hands of a common carrier. There are, however, two cases in which the car is not covered, and it is these two which most often cause friction between the insurance adjuster and the policyholder. One of these is the restriction that loss due to theft by persons in the employ of the assured is not covered. In other words, if your chauffeur sells the spare tire, you have no recourse from the insurance company, but if someone not in your employ makes away with it, you can recover from the insurance company. There is, however, a lower limit to the amount for which you can recover and this constitutes the second restriction mentioned. If the loss is \$25 or less, no recovery is possible in most cases. In some policies, \$25 is deducted from all payments by the insurance company for loss.

One feature in this connection with which very few policyholders are familiar is that such motor-ing accessories as coats, caps, gloves, robes and so on are not covered by the policy. There is a special clause in the policy expressly excepting these from insurance. Only by a

special rider attached to the policy at an additional rate can robes and wearing apparel be covered.

Just the other day, a case in point came up that illustrates this very forcibly. Following his custom of years, a man left his car standing at the curb in a downtown street while he buried himself in the morning's correspondence. When he emerged from the building at noon an expensive fur coat, which each day had been left on the front seat, was gone. He immediately notified the insurance company of his loss. The company refused to compensate for the loss and quoted the clause which specifically exempted the coat from the liability of the company under the policy. He had been leaving valuables in the car ever since he bought it, in blissful ignorance of the plain statement in the insurance policy that the company is not liable.

#### Rates for Fire and Theft

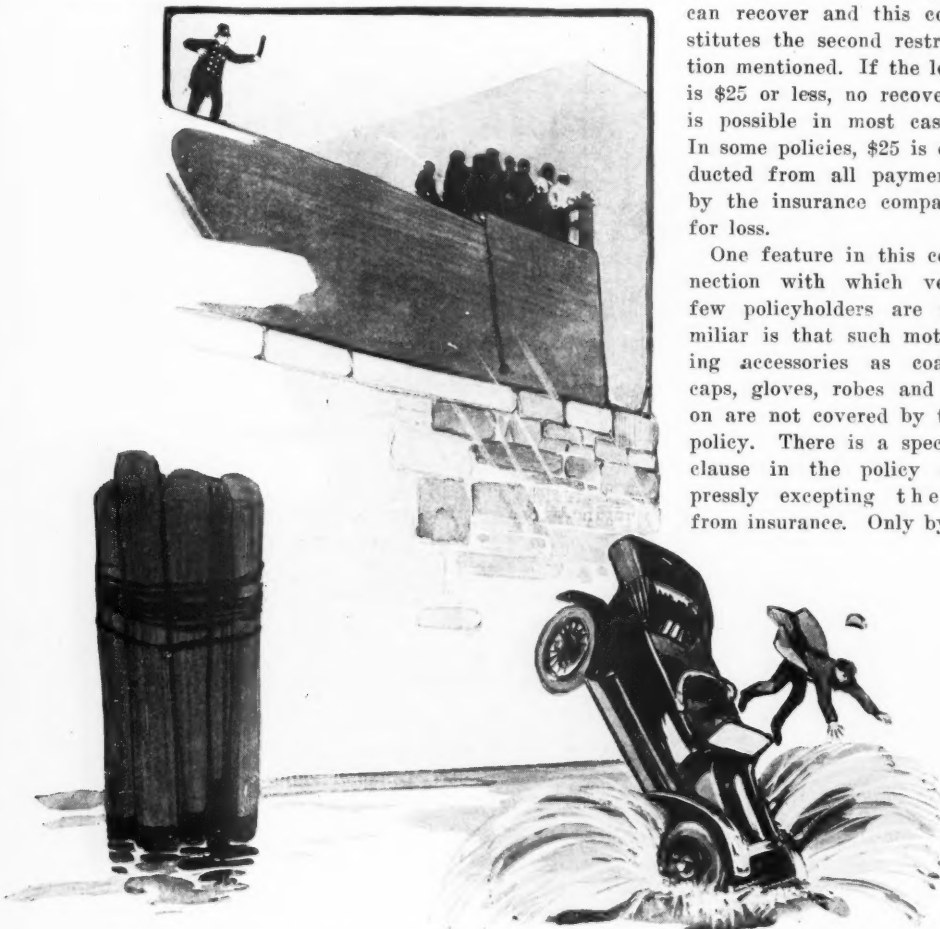
When it comes to the premium rates for insurance, it will be found that these vary in different localities and depend upon a number of different factors. There is less variation in the fire and theft premium rates in different parts of the country than in the other classes of insurance.

All the more important insurance companies are members of an association which fixes the rates, so that the premiums and the regulations are the same for all of them. In fact, the policies for one class of insurance read almost identically and the premium rates for the same car and the same kind of insurance are the same for all the underwriters in the association. Some of the underwriters, however, endeavor to state their terms in simple, non-technical language, which the layman can understand. This is a consideration when buying insurance.

The association, whose right name is the Automobile Underwriters' Conference, has between thirty-five and forty companies. The most common fire and theft policy is called the "conference form" and is used by all the underwriters in the conference. The conference has divided the country into six territorial districts. The rates vary slightly in these different districts, but those of the western district, of which Chicago is the center, are typical.

There is one schedule of rates in this district for premiums on fire and theft insurance—with the transportation coverage mentioned above—on all gasoline private pleasure cars, commercial vehicles, trucks, delivery wagons, hearses, ambulances, fire trucks and patrol wagons. Dealers' cars are about 1 per cent higher, second-hand cars are 1 per cent higher than new cars. Livery and renting cars are 1 per cent higher.

That last sentence sums up the cause of a lot of trouble that has grown recently with the development of the jitney bus. As stated in the paragraph above, the regular premium rate applies only to pri-



SUED ON BASIS THAT DAMAGE WAS CAUSED BY COLLISION OF CAR WITH THE WATER WHEN HE RAN OFF THE BRIDGE



vate pleasure cars, and jitneys cannot be construed as private cars if they are used to carry passengers for hire. They come under the head of livery and renting cars and take a higher rate.

Insuring a motor car is not like insuring a house or its contents, it is more like insuring a ship. The motor car moves from place to place and hence is not an ordinary fire risk.

Contrary to the general impression, an owner cannot insure his car for any amount he may think it is worth, particularly for fire and theft. The underwriters have set certain limits of value beyond which an owner cannot ordinarily get insurance. This amount depends upon the list price of the car, its age, the purpose for which it is used and whether or not it is second-hand.

Not only that, but after a certain age the car cannot be insured at all—except where the agent knows the owner and the history of the car personally. A new car can be insured only for its list price, plus the value of the added equipment. A year-old car can be insured only for a certain per cent of its original list price. A 2-year-old car is insurable for still less and the reduction of valuation for a car 3 years old is still greater.

#### Old Cars Take High Rate

When a car is of greater age than 3 years, only a special dispensation will permit of its being insured at even 40 per cent of its original price. In exceptional cases, where the agent knows the car to be well owned and in good condition, a complete report to the underwriters may increase the amount for which it may be insured, but never can the car of 3 years or more be insured for more than 40 per cent of its original list price.

New cars, that is, cars of this and next year's models, can be insured for their actual cost, as determined by the manufacturer's list prices, but not less than 50 per cent of the list prices. Cars are divided into three classes as to price and the insurable value and the premium rate depends upon the list price as well as upon the age of the car. These classes are as follows: Class A, cars listing at \$3,500 and over; Class B, cars listing at \$1,500 to \$3,499, and Class C, cars costing \$700 to \$1,499.

As stated above, cars of this year's and next year's models, that is, 1916 and 1915 cars, can be insured for their list price, and not less than one-half that. Last year's models, 1914 models, can be insured for 80 per cent of their list price if they cost \$3,500 or more when new, 70 per cent if they cost between \$1,500 and \$3,500 when new and 60 per cent of the list price if their original price was between \$700 and \$1,500.

Two-year-olds, that is, 1913 models, if they listed originally for \$3,500 or better, can be insured for 60 per cent of their original value, 50 per cent if class B, and 40 per cent if less than \$1,500 originally.

Models of 3 years or older, that is, all previous to 1912, can be insured for 40, 30 and 20 per cent of their original value in classes A, B and C, respectively, except in the special cases mentioned above.

#### Age and Price Fix Premium

Premiums to be paid likewise depend on the age and price of the car. This and next year models cost  $1\frac{1}{2}$  per cent for the \$3,500 class,  $1\frac{3}{4}$  for class B, and 2 per cent for class C. Last year models cost  $1\frac{1}{2}$  per cent for class A, 2 per cent for class B and  $2\frac{3}{4}$  for the class C. Models of year before last cost  $2\frac{1}{4}$  per cent of the list price per year for the class A,  $2\frac{3}{4}$  for the class B and  $3\frac{1}{2}$  for the cars listing originally under \$1,500. Cars whose age dates back to 1913 or before take an insurance premium of  $2\frac{3}{4}$  per cent for the class A, 4 per cent for those whose original list price was between \$1,500 and \$3,499 and 5 per cent for the C class.

For cars listing at less than \$700 there are only two age divisions. This year and next year's cars are charged a premium of  $2\frac{1}{2}$  per cent on the full valuation by the maker, but the premium cannot be less than \$10 for the fire and theft policy. For cars less than \$700 of 1914 vintage or older, the premium is  $3\frac{1}{4}$  per cent annually, with a minimum of \$6. Electric cars, no matter what their price or age take an annual premium of  $1\frac{1}{4}$  per cent for the fire and theft floater policy.

For those who are not afraid of theft, some of the underwriters have a fire floater form which when attached to the fire and theft policy restricts it to fire only, with a consequent reduction in the premium rates.

In figuring on the premium to be paid, it is well to know that additional equipment or additional bodies do not take the car out of the classification indicated by the list price. Whenever the list price is for chassis only—a very rare occurrence in the American market—the value of the body must be added to establish the list price for the purpose of determining the rate.

All of the fire and theft policies permit of a reduction of 15 per cent in the annual premium, if one of the approved fire extinguishers is carried on the car. However, the owner must be sure that the extinguisher is approved by the board of fire underwriters and that it is carried at all times. The last is particularly important, because in case of loss covered by a policy on which the fire extinguisher reduction has been obtained, the policy becomes null and void if the insurance company can prove that the extinguisher ever was left off.

For cars in the hands of dealers, special rates are provided, but these are higher than for cars in the hands of owners. Cars whose list price is \$3,500 or over take an annual premium of  $2\frac{1}{4}$  per cent.

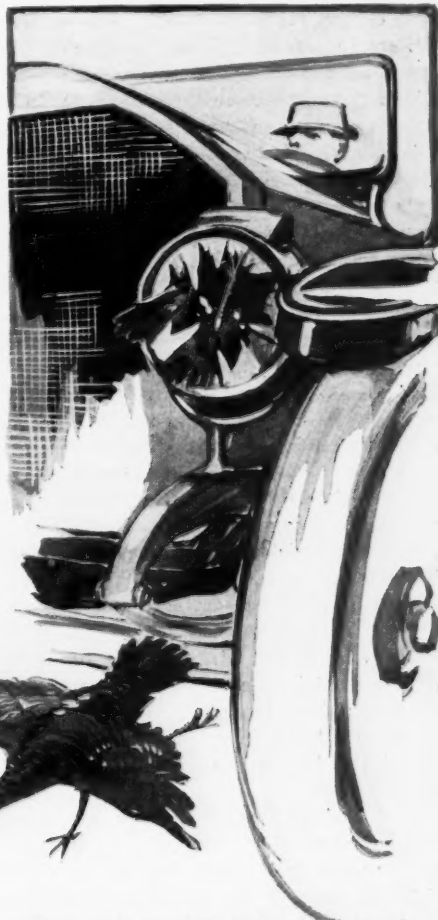
Class B takes  $2\frac{3}{4}$  per cent and

cars listing at less than \$1,500 take a premium of  $2\frac{3}{4}$  per cent. Electricians in the hands of dealers call for a premium of 2 per cent of the list price.

When one thinks of the numbers of cars that are insured each year without anyone connected with the underwriters knowing the owner or seeing the car, it is to be wondered that the insurance companies can afford to assume the risk of the owner disposing of the car to his own advantage and then claiming the insurance under the theft clause. Another factor that offers temptation to the unscrupulous is the fact that the insured valuation holds good for 1 year and the owner may collect the full amount of the policy up to a year from the time it is written, though the car may have depreciated in value very much on account of age, usage or hard service.

#### When Car Is Over-Insured

To illustrate, suppose you bought a 1914 model car listing at \$1,500 in June of 1914. You drove it 2 weeks. The day you took it out of the dealer's salesroom it depreciated 20 per cent, or \$300, the way the insurance men figure it, for it then becomes a second-hand car, so far as its resale value is concerned. Nevertheless, you can insure it any time up to January 1 for its full list value. Suppose you insure it in June for \$1,500. It is not worth that amount in resale value and each month it is worth less. By May of 1915 it cannot be sold for much more than



PACKED AWAY IN THE LAMP HE FOUND  
THE REMAINS OF A HEN



PERSONAL LIABILITY INSURANCE RELIEVES THE HOLDER OF LOSS THROUGH ACCIDENTS TO OTHER PERSONS

\$1,000, for, aside from its 11 months' usage, it is now out of date; the 1915 models of newer lines and possibly lower price give the old car a lower value as a selling proposition than its condition naturally would warrant.

#### Must Pay Full Amount

Suppose in May the car is destroyed by fire, or lost through theft. The underwriters, according to the policy still in force, must pay you the full amount for which the car was insured, \$1,500. Thus you stand to win \$500 at least on the loss. The only chance the underwriter has is by virtue of a saving clause in the policy, by which it can either pay you the full amount of the policy or replace the car with one of equal value. This is called the salvage clause. Usually the insurance company will buy an unused car of the same model as the one you lost and present it to you. Thus you get a new car in place of your old one, and the underwriter saves by being able to buy the 1914 model at a lower price than the original list.

It is to be imagined that many dishonest motorists take advantage of their insurance to beat the underwriters of fire and theft policies, and such is the case. The files of the insurance adjusters offer dozens of instances of ingenious methods by which an attempt to collect the insurance fraudulently, either by collusion or actual participation by the insured was proven. There is reason to believe that in many others in which no proof was found the loss was arranged for by the policyholder.

If I decided I needed a new car to replace my year-old one, on which the insurance period had nearly expired, there is little to prevent me from driving out on a lonely road, kicking loose the gasoline line and trying to repair it with a blow

torch. I am not to be blamed if my efforts to extinguish the fire before it reached the gasoline tank were hasty in the extreme. The very fact that I had insurance would render my hasty retreat the more plausible in a courtroom. If the car were not burned enough to make its complete loss with payment in cash by the underwriters, I will be able to come out a few weeks later with the car rebuilt and refinished with a shiny new coat of paint at no expense to myself. Insurance men say that it is very difficult to prove fraud where loss of this kind occurs.

#### Temptations to Fraud

The theft clause also offers temptation to those whose desire for gain or a new car outweigh their honesty. Frauds of this kind usually require some assistance, so that the profits have to be divided. But as the owner gets money both from the sale of the car and from the insurance company, if the job is successful, he can afford to split with an accomplice. This method of acquiring wealth, however, is becoming more hazardous every day and is not to be advised.

Losses of the insurance companies through fraudulent claims are such an item in their calculations that a special name has been given to this factor. It is called the moral hazard. That this is an important one may be gathered from the fact that 15 per cent is added to the premium rates to take care of this hazard. In other words, honest motorists pay 15 per cent more for insurance than they would if there were no dishonest ones.

Some cars are worse risks from a theft standpoint than others. The more popular the car, the poorer risk it is. Some companies refuse to write theft insurance for

Fords, because the theft rate in these cars is so high. The fact that there are so many of them and all look the same, makes them particularly tempting to the motor car thief, and their recovery correspondingly difficult.

#### Liability Insurance

Next to the fire and theft policies, the insurance most often carried by the motorist is the personal liability policy. Many regard this as the most important form of insurance, as it takes a great deal of risk off the motorist's shoulders. This insurance relieves the holder of loss through his liability for injury or death to other persons, caused by the use of his car.

When one's car is lost by fire or theft, the loss ends there. But an \$800 car may injure or kill someone and its owner may be sued for ten or twenty times the value of his car. Juries sometimes give verdicts for very large sums in such cases. Legal expenses and damages pile up enormously, for lawyers, juries and those injured generally are of the opinion that the usual motorist is wealthy and should pay accordingly. When the owner carries personal liability insurance, the court costs and damages, in fact all the financial end of the difficulty is shifted to the shoulders of the insurance company, in consideration of the amount that he pays as a premium. The personal liability policy is in force as long as the car is within the United States and Canada.

There are certain restrictions with which this class of insurance is protected. The car must not be operated by anyone under 16 years of age. No protection is offered if the injury occurs while the car is being operated in any race or competitive speed test. When an accident happens, the holder of the policy must report to the insurance company in writing all the details and the names of witnesses. Likewise he must forward to the company all summons, complaints or other legal papers connected with it and, with one exception, must make no move toward settling the case or incur any expense in helping the victim without the sanction of the insurance company.

This one exception is a most important one and is covered by what is known as the emergency clause. This provides that the owner of the car may incur expense in procuring immediate medical and surgical attention for any injured person or in removing such a person to a proper place for treatment. Any reasonable bills in such cases will be paid by the underwriters without a murmur.

#### Property Damage Insurance

Property damage insurance provides for the repayment of any sum for which the assured may be found legally liable on account of damage done through the use of his car to the property of any other person. The policy has the same geographical limits as the personal liability policy. This usually is obtained in the form of a rider or endorsement to the per-



sonal liability policy at an additional charge. It is customary to make the maximum loss or the face value of this insurance \$1,000 as there are few accidents in which the damage to other cars or to stationary objects, will amount to more than that sum.

Any damage to any property whatsoever, is covered by this policy—a hen or a house, another motorist's car, or the clothing of a man who has been run over, or of the woman whose skirts you have splattered with mud in passing. The only exception to this insurance is damage or destruction caused by fire. If the insured car burns up, and also burns some one else's car or garage, you can collect on your motor car fire policy for the loss of your own car, but your property damage insurance will not repay you for losses to the other car or garage.

#### Collision Insurance

Collision damage insurance, or collision insurance, as it is more generally known, is insurance covering the car insured against damage done to it, by collision with practically any moving or stationary object, no matter whose the fault. The only exceptions are damage to the car from striking any portion of the roadbed or by striking steam railway rails or ties. This also excludes damage to or destruction of tires, unless the total loss, including that of the tires, amounts to more than the \$200.

With this form of insurance, if the owner damages the car by hitting the doorway in running in or out of a garage, if he damages it by running into or being run into by a train, a street car, another motor car, or vehicle of any sort, by striking a tree, a wall, fence, building, post or even an animal, the damage will be paid for according to the contract by the insurance company.

That the term collision is a broad one as interpreted by reputable insurance companies, may be gathered from the experience of an owner recently. This motorist was driving at a good rate of speed along a country road and started up some hens, which apparently all flew out of his way. A few miles further on he stopped and got out to light up, when he discovered that one of his headlights was smashed. Packed away in the back of it he found the remains of a hen mixed up with the fragments of plate glass and a broken bulb. He had had a collision without knowing it, but the insurance company promptly made good all damage to the car on receipt of the owner's statement of the facts.

Even these broad limits, however, do not seem to be sufficiently comprehensive for some car owners, as witness the case of the policy holder whose car ran off a bridge into the river and who thereupon sued the insurance company for damages, on the basis that the latter was caused by the collision of the car with the water.



LITTLE TO PREVENT ONE FROM KICKING LOOSE THE GASOLINE LINE AND TRYING TO REPAIR IT WITH A BLOW TORCH

Collision policies are of two kinds, one called the "full coverage" and the other the "\$25 deductible average." The first one provides for repayment of damages no matter how slight and the latter provides for payment of any damage after \$25 has been deducted. The full coverage policy costs \$35 a year more than the \$25 deductible average policy. It is doubtful

whether the full coverage is to be desired or not, since to make up for the difference in price there would have to be two claims each year of nearly \$20 each.

#### Premiums for Liability and Collision

Premium rates depend on so many different factors and vary so with different localities and conditions that there is little value in giving exact figures. The personal liability insurance policy protects for \$5,000 in the event of an accident which causes the death or injury of one person, and \$10,000 when the accident is responsible for the death or injury of more than one person. It may be taken out to give greater protection than this, but this figure is the more general. The liability premium is based on the horsepower of the car. The figure used is called the insurable horsepower as distinguished from the advertised horsepower. Insurable horsepower is taken according to the A. L. A. M. or S. A. E. formula, and is found by squaring the bore in inches, multiplying by the number of cylinders and dividing by 2.5.

Another factor which has even more to do with the amount of annual premium for liability insurance is the locality within which the car is to be operated. The different cities throughout the country take different schedules and the smaller cities and towns in different sections of the country have individual schedules. It is one of the chief problems of insurance statisticians to determine the proper rates for each district and the schedule book for liability insurance of any company is quite a complicated affair.



YOU COULD KEEP YOUR CAR IN A POWDER MAGAZINE

To give an instance of this disparity in rates, it is only necessary to mention the liability premiums for the Ford in several cities. In New York the highest rate is charged, because that is where most accidents occur. The owner of a Ford in Manhattan pays \$54.50 to protect himself against the liability for accident; the Chicago owner pays \$52.50 per year. In a city like Peoria, Ill., it costs him only \$34.50, while in villages and small towns some distance away from the larger cities the rate is only \$25.25, or less than one-half of that in the city.

Property damage rates also are based on insurable horsepower, but it cannot be written for sums less than \$1,000. For each \$100 additional, private pleasure cars pay 4 per cent and others 2½ per cent. The minimum annual premium for \$1,000 property damage insurance is \$7.50 on electrics and motorcycles and \$10 on all other motor vehicles.

Collision insurance is written on an additional premium based arbitrarily on the cost value of the car and is about 2 per cent of the list price. Collision insurance provides that the car shall be restored to the same condition as before the accident.

#### **BIJUR SUES ECLIPSE**

New York, April 12—Suit has been brought by the Bijur Motor Lighting Co. against the Eclipse Machine Co. to restrain the latter concern infringing a patent held by the Bijur company, the suit charging that the Bendix drive used in coupling self-starters to engines, and manufactured by the Eclipse company, infringes patent No. 1,095,696 issued to Joseph Bijur May 5, 1914. The Bijur patent covers a pinion riding on a threaded shaft, which apparently is a basic feature of the Bendix drive mechanism. Suit has been brought in the United States district court of the western district of New York.

An interesting aspect of the present suit is that Vincent Bendix, after whom the Bendix drive is named and who has manufacturing arrangements with the Eclipse Machine Co. to manufacture his device, and who has several patent covering features of his device, signed a contract July 9, 1914, with Walter C. Allen of the Bijur company giving Mr. Bendix the exclusive right to manufacture under the Bijur patent No. 1,095,696, and since such contract the Bendix products have been stamped as licensed under said patent.

#### **SPEEDWELL AFFAIRS SETTLED**

Dayton, O., April 12—The creditors' committee of the Speedwell Motor Car Co., of Dayton, announces the successful culmination of its efforts in effecting an amicable settlement of the claims of the general creditors on the basis of 10 per cent. More than three-fourths of the general creditors, holding claims of approximately \$60,000, have signed the agreement. Holders of the \$150,000 bonds also approve

the settlement and will assume the obligations of paying off the general creditors. These steps were necessary in order to get the plant in shape for disposal to the Recording and Computing Machine Co., which has started to remodel the plant and to construct a number of new buildings.

#### **KARDO LOSES PATENT SUIT**

Cleveland, O., April 13—Special telegram—Judge John H. Clarke, in United States district court, dismissed the patent infringement suit of the Kardo Co. against Henry J. Adams, dealing as the Reo Motor Sales Co. His opinion, sixteen pages long, held that the Kardo Co. was not lawfully formed under the statutes of Ohio. Judge Clark also pointed out that innuendos made at the February hearing prompted him to make investigation of the organization.

"Articles of incorporation for the Kardo Co. were signed February 21, 1914, by five men who are members of the law firm of the organization," the decision reads. "Each subscribed one share of stock; one subscribed as trustee of the American Ballbearing Co. for 997 shares, payable \$9,500 in cash and \$90,000 by transfer of patents by the American Ballbearing Co. to the Kardo Co.

"The Ohio laws differ from the laws of many states in that the mere filing of articles of incorporation in due form does not create a corporation, notwithstanding the provision that a certified copy of articles shall be prima facie evidence of its existence. The law requires that 10 per cent of the stock be paid in. This was not done.

"While there is no disposition on the part of the court to impute actual or intended fraud to the parties engaged in this enterprise, yet the law of the case is not different from what it would be if such were the fact."

#### **STUTZ ENTERS INDIANAPOLIS**

Indianapolis, Ind., April 10—With the nomination of three cars today by the Stutz Motor Car Co., of this city, the total number of entries for the fifth annual 500-mile race to be run over the Indianapolis speedway May 29 was brought up to fifteen and it is expected that before the lists are officially closed the last day of this month at least forty contenders for the \$50,000 purse will be named by their owners. In addition to the three Stutzes, the field to date includes three Maxwells, two Duesenbergs, Ralph de Palma's Mercedes, John de Palma's Delage, two Sunbeams, Chevrolet's Cornelian, a DuChesneau and Rene Thomas' entry.

#### **OLDFIELD WILL DRIVE BUGATTI**

Venice, Cal., April 7—Barney Oldfield today signed to drive the German Bugatti racer, owned by Charlie Fuller, of New York and Venice, in the next 500-mile race on the Indianapolis speedway. Fuller's German speed creation was driven in the Vanderbilt cup and grand prix

races at San Francisco and in the Venice race, March 17, where it finished fourth, by J. B. Marquis.

Fuller has been living at his Venice home for the past few weeks and secured a permit for Oldfield to try his car out on the Venice parkway last Tuesday. The master driver was well pleased with the German car and the deal was closed today, for the veteran to pilot the Bugatti on the speedway.

The car has been shipped to Cleveland where it will be overhauled and prepared for the 500-mile race at the White factory. Fuller has shipped one of his touring cars to Chicago and intends to drive to Cleveland and then to Indianapolis.

Oldfield left tonight for El Paso, Tex., where he is to drive his Fiat cyclone in a track event April 10.

#### **WINS AJAX TIRE CONTEST**

New York, April 14—Special telegram—Second annual Ajax tire mileage contest for chauffeurs was won by G. C. Jensen in a Cadillac with a mileage of 21,985 miles. Second prize went to Frank Gray in Peerless, mileage 21,483 miles, and third prize to A. C. Smith in Cadillac, mileage 21,039 miles. There were fifty-five other prize winners.

#### **ANOTHER ST. PAUL SPEEDWAY**

St. Paul, Minn., April 9—This city is again promised two speedways. This comes about through the incorporation today of the Twin City Motor Speedway Co. by H. E. Habighorst, C. W. Van Orsdol and J. F. Sperry. The capital is \$1,000,000. These three men formerly were part of the Twin City Motor Speedway Association, a rival of the Minnesota Motor Speedway Association, which two organizations a week ago were said to have reached an agreement whereby there was to be only one speedway plan and only one track, when originally each organization announced it would have a speedway somewhere between St. Paul and Minneapolis.

Then more complications arose, with each side claiming it was to be the surviving organization. Out of this tangle comes the incorporation of the Twin City Motor Speedway Co., backed by the above men, who were associated with W. D. and J. D. Hogan, Minneapolis; Dr. C. E. Dutton, Minneapolis, and F. H. Wheeler, Indianapolis, in the Twin City Motor Speedway Association.

H. C. Moore, fiscal agent for the Minnesota Motor Speedway Association, stated that final financial arrangements had been made for his company to remain in the field and build a speedway on the site near Lake Josephine, as the original intention of the organization.

The site on which the Twin City Motor Speedway Co. states it will build a track is conveniently situated between St. Paul and Minneapolis, farther south than the Lake Josephine site of the other proposed speedway.



# Marmon Test Shows Fuel Economy of Country Travel

## High Gear Run Through Chicago Loop Offers Interesting Comparisons

CHICAGO, April 8—That traffic conditions have a great deal to do with fuel economy was demonstrated clearly today in one of the most unique tests on record, when a model 41 Marmon six was driven through every street of the loop, Chicago's most congested down-town district, with the gearset lever locked in high. The car criss-crossed the loop in both directions, traveling first through all the east and west streets and then through all the north and south streets, covering 10½ miles in its journey through the section bounded by the elevated railroad structure.

Accurate account of the gasoline used on this trip was taken and found to be 1.355 gallons for the 10.5 miles. This gives a consumption of 7.75 miles per gallon for the congested district. The car was then taken out on the dirt roads of Grant park where the conditions approach very close to ordinary touring conditions. Here the economy was found to be nearly double that obtained in the loop, the car running another 10.5 miles on only .666 gallons, making 15.75 miles per gallon for the road test.

These results will be of interest to owners in showing why their fuel economy is lower than they expect when the car is operated in the city. According to this it takes twice as much gasoline to drive a car through the congested traffic as it does in ordinary country touring.

In connection with this comparative economy test, Manager Gambill, of the Chicago Marmon branch, incorporated the feature of a high-gear run, to demonstrate the flexibility of the engine and the quality of the clutch. The gearset lever was locked in high and was not touched during the entire trip through the down-town streets and Grant park. That this constituted a most strenuous test, may be

gathered from the fact that during the 10½-mile journey through Chicago's most congested traffic, sixty-seven stops were necessary in compliance with the traffic policemen's whistles or blockaded streets. At other times it was necessary to run at speeds as low as 2½ and 3 miles per hour.

After each of these sixty-seven stops the engine started the car on high, with a steady, even pull and exhibited no tendency to labor even when, as was the case most of the way, seven persons were aboard. In every case the clutch was dropped in and only twice did the driver slip the clutch noticeably.

An interesting commentary on the delay caused by the traffic was given in this test by the fact that it took 1 hour and 25 minutes to cover the 10½ miles, giving an average speed for the distance of 7.4 miles per hour. The same distance in Grant park took only 32 minutes.

The test was held under the auspices of the Chicago Automobile Club and was conducted by Darwin S. Hatch and E. G. Westlake, of the club's technical committee. The car used was a five-passenger Marmon 41 having a gear ratio of 3.9 to 1 and with 36 by 4½ Silvertown cord tires. It was equipped with a Stromberg carburetor and Bosch magneto. William Binz, of the Marmon branch, was the driver, and in addition to the two club officials, Manager Gambill and local newspapermen rode with him.

Examination of the clutch facing after the loop test failed to show any wear and its unusual construction had much to do with the excellent showing made in the high-gear run. The clutch is a combination of cone and disk, having a Thermoid-faced cone and five plates within the flywheel. Red Crown gasoline was used which had a gravity of 59 degrees Baume at 60 degrees Fahrenheit.

A special fuel tank was fitted under the hood, eliminating the stock gasoline feed system. The fuel was measured by a gallon measure certified by the city sealer.

### REFUSE TO TAKE INSURANCE

Los Angeles, Cal., April 9—Jitney drivers of this city are forcing a referendum vote at a special election for the purpose of squelching the recently passed regulating ordinance and also for the purpose of putting into force an ordinance gotten up by themselves.

The jitney drivers refuse to carry any insurance and will not confine themselves to any definite route and also insist on carrying people on the running board. The city council, the merchants and civic organizations say they will not tolerate this.

The ordinance passed by the council is intended to regulate properly the jitney buses, confining them to definite routes so that they will be under police supervision and force them to carry adequate insurance to protect life and limb and not permit overcrowding or riding on the running board.

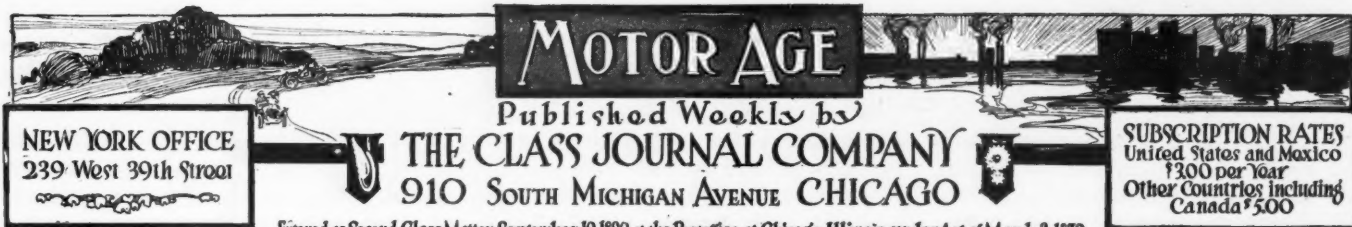
The reason for the measure passed by the council is that of all the accidents and deaths caused to date by jitney buses, it appears that there has not been found one instance where anyone has been able to recover a cent of damages.

### NEW CALIFORNIA TRUCK TAX

Sacramento, Cal. April 12—Under the conference bill introduced in the senate last week by Senator Birdsall, motor trucks will be taxed \$5 for 4,000 pounds of empty weight and more for greater weights up to 8,000 pounds, for which a tax of \$20 is imposed. License plates will not be changed yearly, but a small disk, indicating the year, will be attached each season.



HIGH-GEAR MARMON RUNNING THROUGH CHICAGO'S LOOP DISTRICT



NEW YORK OFFICE  
239 West 39th Street

# MOTOR AGE

Published Weekly by  
**THE CLASS JOURNAL COMPANY**  
910 SOUTH MICHIGAN AVENUE CHICAGO

SUBSCRIPTION RATES  
United States and Mexico  
\$3.00 per Year  
Other Countries including  
Canada \$5.00

Entered as Second-Class Matter September 19, 1892, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

Member of the Audit Bureau of Circulations  
Circulation Audited and Verified December 8, 1914

## Insuring the Car

**B**USINESS men who have cars employed in the transaction of their commercial enterprises see that these cars are fully covered by insurance within a very short time after they are acquired. They realize that it would be bad business to permit the cars to operate without being protected against loss by fire or theft or without protection against loss to the company through damage to its own car or other people's property, or through damage suits arising from personal injuries occasioned by the vicissitudes of traffic or carelessness of drivers.

**N**OTWITHSTANDING the fact that they insist upon insurance for their business cars, frequently they fail to apply the same principles to their private vehicles. It would seem that if insurance were considered necessary in the one case it would be in the other. Insurance is recognized as a business safeguard; it is necessary as a safeguard to the private pocket-book.

**P**ROBABLY the least appreciated of the various classes of insurance with which a car should be covered is the one called the personal liability policy. The object of this is to prevent the owner from incurring expense as the result of an accident in which some one is injured by the car. The need of such protection necessarily is greater in the cities than it is in less congested districts, but accidents can and do happen in front of the corner grocery as well as between department stores.

**T**O illustrate the value of this type of insurance, consider the owner who has purchased a \$1,000 car. This owner probably will insure it against fire and theft but he forgets that he may be subjected to a suit for ten or twenty times the cost of the car by injuring or killing a pedestrian.

**O**F those who have insurance on their motor cars, comparatively few really know their policies. Most of the motor-

ists carefully file their insurance policies away without more than a glance at them. The policies repose in the safety deposit vaults and the policyholders drive on in blissful ignorance that they may be doing things every day that render their policies null and void. Have your car insured and then know your policy. One is as important as the other.

**O**NE cannot be sure that he always will do the proper thing at the proper moment to avoid a serious accident. Where novices are to drive the car, insurance covering collision, property damage and personal liability are doubly necessary. Novices are more than likely to lose their heads, in the popular parlance, and do just the thing that should not be done if quick thinking becomes necessary or an emergency presents itself.

**T**AKE, for instance, the case of the Chicagoan who permitted his wife to drive an electric for the first time. Reveling in the new-found accomplishment, the woman took a neighbor downtown on a shopping expedition. Coincident with reaching a particularly congested corner, the occupants became engaged in a most interesting discussion on the price of hats or a similarly absorbing topic. They failed to notice an old woman who, market basket on arm, was crossing the street at the same time. The electric struck the pedestrian, knocking her down.

**T**HE driver screamed and in her flurry, reversed the car, passing over the prostrate woman for the second time. The traffic policeman on that corner vows that had he not prevented it, the distracted pilot of the electric would have gone forward and run over her victim a third time. With the best of intentions, this novice did just the wrong thing and it was only the possession of a personal liability policy that prevented a rather heavy payment. As it was, the expense and worry of the settlement was delegated to the insurance company.

## Traffic Conditions and Fuel Consumption

**M**OTORISTS often have been puzzled by the disparity between the official and semi-official fuel economy records and the results they obtain with cars of the same type in every-day running. Of course there is something in their contention that usually the cars on which the tests are made are handled by expert drivers, and also that routes are selected to be such as will give the best showing when these tests are made. But it is the difference in operating conditions that accounts for the most part for the lower mileage obtained from a gallon of gasoline in actual service. Without stopping to consider the question, few realize the amount of fuel that is burned for naught when the car is waiting the traffic policeman's whistle at a busy corner.

**N**EVER has this fact been brought out more forcibly than it was last week in the Marmon high-gear test in Chicago. The loop, Chicago's most congested district, was threaded, the

car traveling all the streets within the district bounded by the elevated lines, taking first the east-and-west streets and then the north-and-south streets. The same distance was covered over the roads in one of the city parks—roads that were, if anything, a little worse than average country roads, so far as the surface was concerned, but which offered a clear path for the run.

**C**OMPARISON of the fuel used demonstrated that it took twice as much gasoline to drive the car through the congested loop district as it did in the park. In 10½ miles of traveling in the city streets sixty-seven stops were necessary, all of which meant an increase in gasoline consumption. The fact that it was possible to average only slightly over 7 miles per hour through the loop is an eloquent testimonial to the time lost in heavy traffic.



# Dixie Highway Launched at Chattanooga Meeting

## Friction Results Over Selection of Definite Route

CHATTANOOGA, Tenn., April 10—Despite considerable friction and rivalry that has developed over the manner of selecting a definite route, the north and south eventually are to be joined by a motor road the equal of the Lincoln highway, the great transcontinental trail which links the Atlantic to the Pacific.

At least this was the prevailing sentiment of the governors' conference held in this city last Saturday and attended by Governor Ralston of Indiana, Governor McCreary of Kentucky, Governor Rye of Tennessee and Governor Slayton of Georgia in addition to 6,000 less notable delegates from as far north as South Bend, Ind., and as far south as Miami, Fla. The governor of Ohio was represented by Harry L. Gordon, the lieutenant governor, and the governor of Florida sent as his special envoy H. S. Kealhofer. Governor Dunne of Illinois wired his regrets.

The conference was enlivened by a contest that arose regarding the method by which the route should be chosen. It was originally planned to form a Dixie Highway Association, similar to the Lincoln Highway Association, and select a route only after a corps of engineers had traveled the roads between Chicago and Miami and reported back to the original founders of the association. Before the meeting was called, fifteen men had agreed to serve as original founders of the organization and to contribute \$1,000 annually for 5 years for the support of the association.

On presenting this plan to the governors for their sanction, exception was taken by the notables as to the manner in which the route was to be selected. The chief executives adopted resolutions providing for the appointment of two men each by the governors of Illinois, Indiana, Kentucky, Tennessee, Georgia and Florida and empowering these appointees to select the route in their respective states.

When this resolution was brought before the general convention, several of the original founders of the Dixie Highway Association withdrew on the ground that the governors' plan deprived the organization of its rights. After several hours of heated discussion, however, the plan of the governors was accepted.

As there is considerable friction in Tennessee between Governor Rye and C. E. James, president of the Incorporated Dixie Highway Association of that state, it is difficult to see how the governors' plan will work out. It is claimed that Governor Rye will influence his appointees to a route that is not endorsed by the faction headed by President James.

Delegates from Cincinnati wish the Dixie highway to pass through their city and thence cross the blue grass district of Kentucky and over Waldren's Ridge into

Chattanooga. Such a route selection probably would delay the construction of the road as the Kentucky and Tennessee thoroughfares in that section are in a deplorable condition. This routing also would eliminate Louisville and Nashville.

### JITNEY FEES REDUCED

Los Angeles, Cal., April 7.—The report of the finance committee recommending that the license fee for jitney buses in Los Angeles, be reduced from \$15 per quarter to \$7.50 was unanimously adopted. The report, constituting a \$6,000 cut in the city's revenue from this class of vehicles, was a present to the city's treasurer. It was necessitated by the ruling of the city attorney that the jitney buses had been assessed under an improper interpretation of the license ordinance.

The interpretation of the ordinance as to what a jitney bus really is, was asked

for by the council in order to pave the way for action to compel the bus operators to conform to one standard of business and stop competing with taxicabs. Demand to this effect has been made by the taxicab concerns. The taxicabs have to pay \$15 per quarter and the owners contend that if the buses engage in the taxi business, charging 75 cents an hour and upwards, the buses should be compelled to pay the same.

### BREAK GROUND AT DETROIT

Detroit, Mich., April 8.—The first sod for the proposed Detroit motor speedway at Sibley, Mich. was turned this afternoon by Park Commissioner William T. Dust, of Detroit. The mayors of several nearby towns, the officers of the Detroit motor speedway and a delegation of motorists and special invited guests were present at the ceremony.

See America First —  
• • • See America Now



EDITOR'S NOTE—This is the twenty-second of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run in Motor Age for the purpose of calling the attention of motorists to the picturesque points of interest in their own country.

### NO. 22—HOTEL AT NAUVOO, ILL., MADE OF STONES FROM THE MORMON TEMPLE

On the banks of the Mississippi river and in Hancock county, Ill., is the settlement of the early Mormons, the town of Nauvoo, whence came Joseph Smith and his followers in 1840 when the Latter Day Saints were expelled from Missouri. There Smith and his band started the erection of a temple of white sandstone that was not completed when the new religious sect was driven out of the state in 1846. The abandoned building was partially destroyed by fire in 1848 and further ruined by a tornado in 1850, but much of the material was not damaged and was used in the construction of the Nauvoo hotel which now offers accommodations to motorists touring in the vicinity of the former Mormon mecca.

# Big Financial Interests Back of New York Speedway

## Historic Sheepshead Bay Track to be Made Motor Racing Course

NEW YORK, April 13—Special telegram —After years of wasted talking and futile planning, New York is to have a \$2,500,000 speedway within 35 minutes of Broadway. With the completion of the colossal track, the metropolis of the country once more will occupy the proud position on the motor racing map that it held in the halcyon days when the Vanderbilt cup classic was run annually on Long Island and Brighton Beach was the scene of 24-hour grinds.

New York's 2-mile speedway has passed beyond the realm of projects seriously contemplated. It is assured. Money to finance the undertaking has been partially raised and actual work has been started. The Sheepshead Bay Speedway Corp. has been incorporated with a capital stock of \$2,500,000, made up of \$1,000 in 7 per cent cumulative preferred stock and \$1,500,000 in common stock. An option on a piece of property, 432 acres in area and located only 8 miles from the city hall, has been closed.

### From Horse to Motor Car

As a site for New York's saucer of speed, Sheepshead Bay race track, historic in the annals of the sport of kings, has been secured. Here, when the bricks are laid, grimy men in khaki will meet with engines throbbing and exhausts roaring where once satin-bloused jockeys rode the necks of blue-blooded contenders for the Futurity and Suburban. These turf classics are no more but a new sport of kings, in which creatures of steel race for fame and fortune, has been born and to this sport, New York's speedway will be dedicated.

Sheepshead Bay track, bought from the Coney Island Jockey Club, is considered an

ideal location for the motor speedway. Within a radius of 20 miles of the proposed site is a population of more than 8,000,000, practically one-twelfth of the population of the United States. The track is but 10 minutes ride from Coney Island, 20 minutes from Brooklyn and 35 minutes from the heart of New York. When the matter of getting to and returning from it is considered, nothing better could be desired. Ocean avenue, one of the greatest motor driveways in New York, connects from Prospect park, Brooklyn, and runs right up to the main entrance, thus giving a boulevard approach, with a driveway 100 feet wide, for all motorists. The Long Island railway comes direct from New York to within a block or so of the track. Within two blocks is the Brooklyn rapid transit system which connects with the New York elevated and subway lines. In addition, the trip can be made by boat from Coney Island which is but 10 minutes' distance.

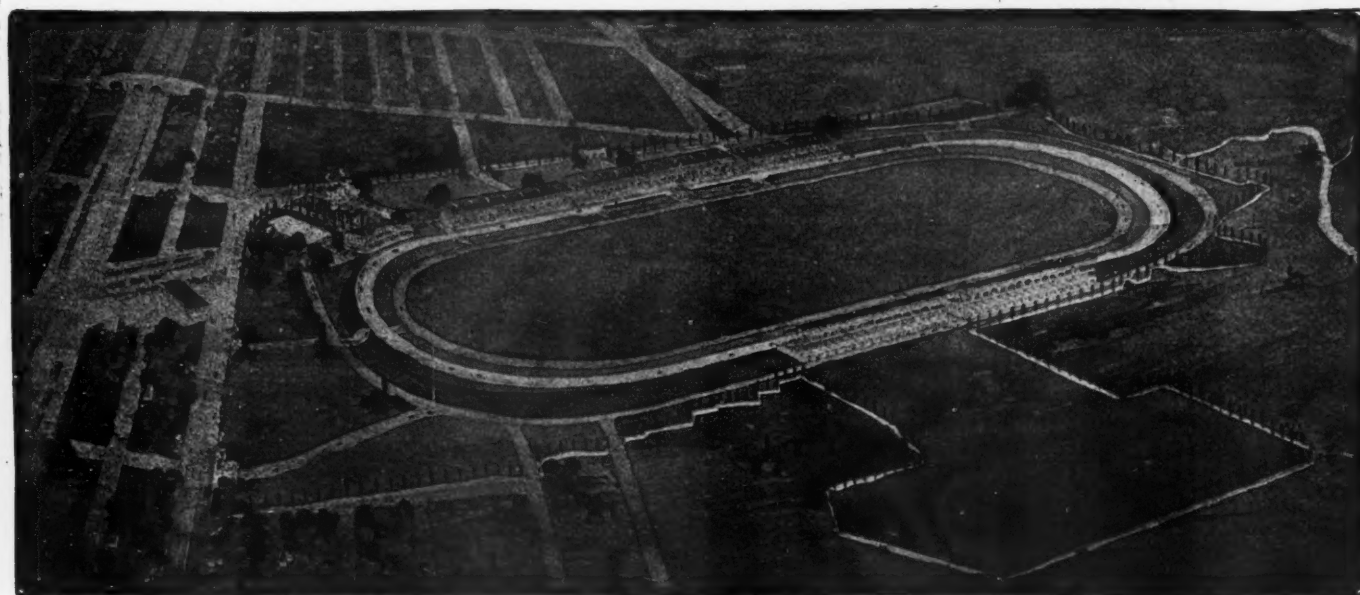
Father Knickerbocker's speedway project is backed by the wealthiest interests in the country. Among the stockholders are Percy R. Pyne II, a member of the Mose Taylor family and representing the firm of Pyne, Kendall & Hollister, which has underwritten the majority of the stock; Horace M. Kilborn; Charles E. Danforth, of Vanemburgh & Atterbury; Charles S. Sabin, president of the Guarantee Trust Co., New York; George F. Baker, vice-president of the First National Bank, New York; Frank Bailey, vice-president of the Title Guarantee and Trust Co., New York; William Hull Wickham, of McKesson & Robbins; Kenneth Cowan; John J. Haynes; Mrs. J. W. Gates; Anderson T. Herd; John J. Mitchell, president Illinois Trust and Savings Bank, Chicago; Stanley Field, son

of the late Marshall Field; A. J. Farwell, vice-president of the J. V. Farwell Co., Chicago; John M. Scott, of Carson, Pirie, Scott & Co., Chicago; A. A. Sprague, of Sprague, Warner & Co., Chicago; Watson F. Blair, director of the Corn Exchange National Bank, Chicago; W. R. Linn, of the Southside Electric Railroad Co.; J. M. Cudahy, of the Cudahy Packing Co., Chicago; George A. Thorne, head of Montgomery Ward & Co., Chicago; James Deering, of the International Harvester Co.; James Stuart, of the Quaker Oats Co.; Chauncey B. Keep, of the Merchants Loan and Trust Co.; James A. Patten; Frank G. Logan, of Logan & Bryan; F. R. McLennan, director of the Continental Commercial National Bank, Chicago; Edward C. Carter; G. C. Nimmmons; Fred Norcross; George R. Fearing, Jr.; and N. F. C. Kachelmacher.

### Motor Industry Is Represented

Among the prominent stockholders in the New York speedway that are affiliated with the motor industry are Carl Fisher, president of the Prest-O-Lite company and the Indianapolis speedway; A. C. Newby, of the National Motor Vehicle Co.; Hugh Chalmers, president of the Chalmers Motor Co.; H. M. Swetland and David Beecroft, of the Class Journal Publishing Co.; Fred J. Wagner; Ralph de Palma; J. C. Nichols; I. M. Uppereu; S. S. Toback; Charles E. Reiss; A. J. Kaufman, president of the Peugeot Auto Import Co.; William Parkinson, of the Stutz Motor Car Co.; William A. Allen, president of the Allen Tire Cover Co.; William C. Poertner; Nathan Lazarnick and John Wetmore.

As an investment, the purchase of the Sheepshead Bay track should prove very profitable and one of unlimited possibili-



ARCHITECT'S DRAWING OF FATHER KNICKERBOCKER'S PROPOSED BRICK OVAL OF SPEED



ties. At the present time, the 432 acres is occupied with a track that measures a little more than a mile in circumference. Modern homes surround the speedway site on all sides. The property is now assessed for \$2,400,000 and its improved value is estimated at \$3,000,000. Within 10 years it will be worth \$5,000,000, according to the present rate of increase in the value of Brooklyn property.

According to the plans, New York's speedway will be a 2-mile track of brick construction and so scientifically banked as to permit a speed of 150 miles an hour for consecutive laps. Although patterned after Carl Fisher's oval at Indianapolis, minor improvements will be made. The New York saucer will be a trifle wider than the Hoosier speedway and the banking will be more of the saucer type.

In order to accommodate 200,000 spectators, two grand stands with boxes will be erected. The main covered stand will seat 125,000 and the uncovered pavilion 75,000. There will be a parking space of 20,000 motor cars within the enclosure.

The promoters have already agreed upon a program. Two major races will be held on the speedway annually, one in the early spring and the other about the middle of autumn, and each event will be over a distance of 500 miles with cash prizes totaling \$50,000 or more. It also is planned to schedule two 24-hour races each season for purses of \$20,000 in addition to motorcycle events. The speedway will not be given over entirely to racing. An effort will be made to have games for the world's baseball championship, international polo matches and big eastern football contests played within the track enclosure.

#### Hope to Popularize Racing

To make motor racing the king of sports is the aim of the wealthy men who are financing New York's speedway. They are not content to build a track on which the stamina of machines and the courage of men can be put to the most rigorous test. They propose to do more. They hope to interest more manufacturers in racing and induce millionaires to purchase speed creations as they did in the early days of Vanderbilt cup competition.

To James C. Nichols, a local accessory dealer, belong the title of "the father of Manhattan's speedway." More than a year ago he commissioned Anderson C. Herd, who has been associated in the real estate business with A. C. Newby, of Indianapolis, and others, to secure a location for a track, within the zone of Greater New York. An option was secured on the Sheepshead Bay property. Mr. Herd interested Mr. Kilborn in the project and secured the co-operation of John C. Wetmore and Fred J. Wagner who worked on the plan until its recent realization.

Last summer, \$800,000 in stock was subscribed and \$300,000 paid in, but the European war caused the promoters to cease their stock-selling activities for 6 months, until financial conditions became normal.



MAP SHOWING LOCATION OF SHEEPSHEAD BAY SPEEDWAY

## Brewster-Knight Announced

NEW YORK, April 12—The Brewster-Knight chassis of which considerable rumor has been going around throughout the industry will shortly be in a state of actual production. The experimental job now has run 4,167 miles on the roads in this vicinity and with few exceptions is a good representation of what the finished job will be.

The new Knight product was designed by Owen Thomas, engineer for Knight & Kilbourne at the Brewster Bros. plant in Long Island City. It incorporates a Knight engine of standard design with its 4 by 5.5 inch cylinders cast in a single block. The Knight characteristics have not been altered in any degree, but the auxiliary fittings have been made to suit this particular mounting. A good example of this is in the arrangement of the water pump and magneto, which are driven from a single shaft on the right side of the motor through a leather flexible coupling. The Bosch magneto is tilted slightly in its mounting on the crankcase to bring the armature shaft out far enough to make a suitable connection for the straight line drive of the water pump shaft.

Gasoline will be fed by the Stewart-Warner system, which is supplied by an 18-gallon gasoline tank mounted on the rear of the frame. Lubrication is by a full pressure feed with leads to each sleeve bearing surface and through all the main bearings.

The drive is taken by a cone clutch which is faced with fabric and provided with engaging springs, to a three-speed gearset. There is only one universal in the drive, this being a letter design at the

forward end of the driveshaft. Besides the universal there is a laminated steel plate joint which provides an easy means of adjustment fore and aft in the length of the driving members. Final drive is through spiral bevel gears to a floating axle. The ratio of reduction between the drive pinion and large differential gear is 4.08 to 1 on the experimental car and this reduction will probably be adopted for the final job. The driveshaft is enclosed in a torque tube which takes the drive, and the entire drive is floating by the use of a design, which includes a rigid connection between the torque tube and the gearbox and a ball joint connection between the gearbox and the frame.

On the experimental car there is a U-S-L starting and lighting system, and the probabilities are that this will be adopted on the final job. There are many other features, however, which are not fully determined. One of these is the springing, which, although probably a modified Lancaster design, giving a long cantilever having an overall length of 102 inches, has not as yet been fully decided upon. The tires will be 34 by 4½ inches, the wheelbase 125 inches, and the turning radius 32 feet. The brakes are connected to the operating mechanism by cable connections.

The price of the stripped chassis will be \$4,000, and the body will be of special design to suit the needs of the purchaser, although a few stock bodies will be put through as standardized design for the general trade.

## BOWSER SUES WAYNE COMPANY

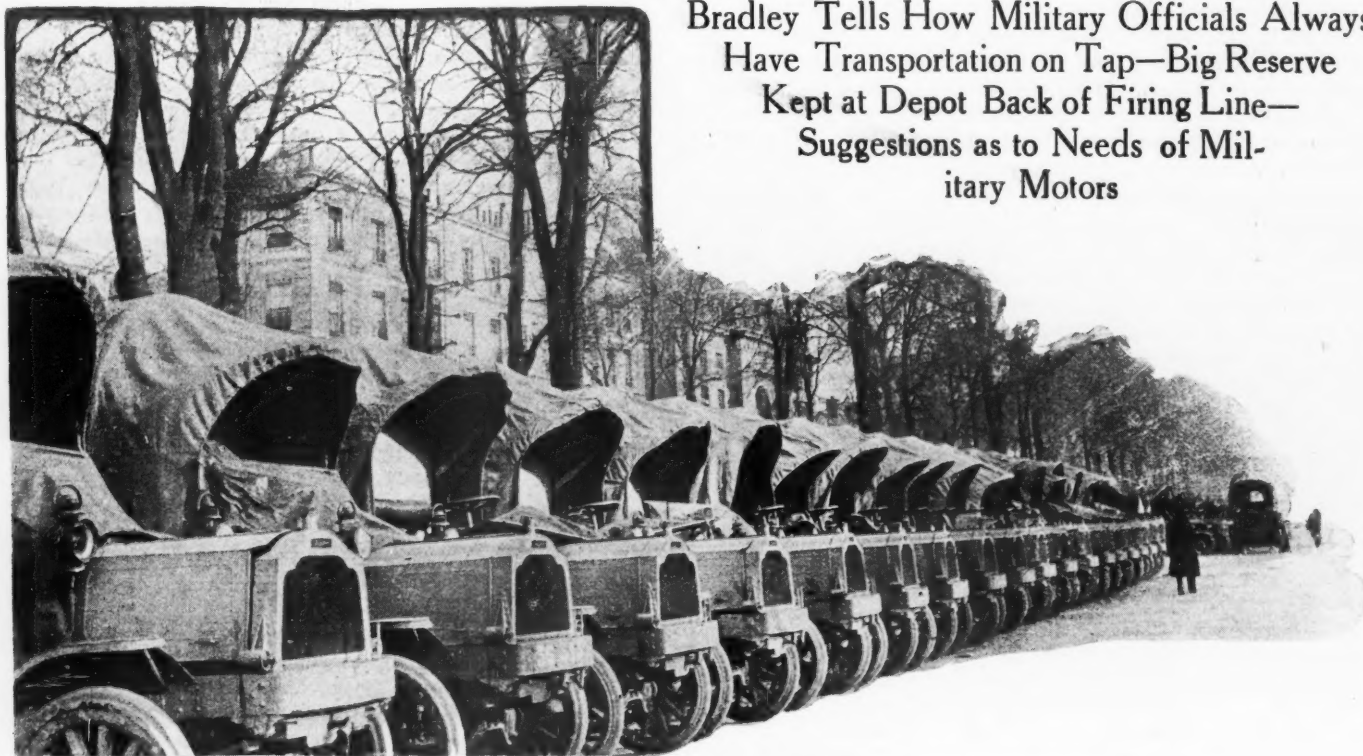
Chicago, April 13—Two bills of complaint have been filed in the United States district court for the northern district of Illinois, by S. F. Bowser & Co., Ft. Wayne, Ind., against the Wayne Oil Tank and Pump Co., of the same city, charging infringement of three patents now held by the first-named concern. Both companies are manufacturers of gasoline and oil storage systems, fuel and oil dispensers, etc. The bill of complaint names the Chicago branch of the Wayne company, this being the most convenient means of bringing the suit in a Chicago court.

In one bill the Bowser company claims infringing of patent No. 1,020,077 which was granted March 12, 1912, and patent No. 875,689, granted January 7, 1908. Both were issued to S. F. Bowser and assigned to the company bearing his name. They relate to improvement in filling and vent-filling devices used in gasoline storage and dispensing systems.

The second bill names patent No. 1,108,673, filed as early as 1911 by Reuben E. Bechtold and Herbert J. Grosvenor, the patentees, and issued August 25, 1914. By assignment, the Bowser company has obtained this patent, which relates to dispensing apparatus. The attorney for the Bowser company claims the concern's Red Sentry outfit, a sidewalk type of fuel dispenser, is the one referred to in this bill.

# More than 400 American Trucks in French Service

Bradley Tells How Military Officials Always Have Transportation on Tap—Big Reserve Kept at Depot Back of Firing Line—Suggestions as to Needs of Military Motors



A FLEET OF PANHARD TRUCKS WAITING IN A FRENCH DEPOT FOR ORDERS TO PROCEED TO THE FRONT

PARIS, April 5—In a broad four-track avenue some miles back of the firing line in France 500 motor trucks, representing a value of a million and a quarter dollars, are lined up with the regulation space of 3 inches between hub caps. Of this big fleet more than 400 machines are of American make, supplied by White, Pierce, Packard, Kelly and Jeffery. This is the French army motor store, or clearing house, in which the trucks are received after the trip by road from the port of landing, where they are examined and placed in the hands of the men who will drive them at the front, and from which the various army commanders make their drafts. Tomorrow the stock may have reduced to a hundred; 3 days later it may be back again to the original figure of 500, for while the calls are irregular the supply continues without a break.

## Modifying American Trucks

Before putting American trucks into active service, slight modifications are carried out. While the French army authorities are of the opinion that any well constructed 2 or 3-ton truck is suitable for army work, irrespective of its design, there are certain features such as size and type of body, interchangeability of magnetos and carbureters, tool space, clearance, nature and size of gasoline and oil tanks, protection for driver, on which it is desirable to have the greatest possible uniformity. Quick deliveries being needed, American trucks were accepted absolutely as they are supplied to American customers, the purchasing officers recognizing

By W. F. Bradley

that to insist on detail changes would entail considerable delay.

In practically every case the canvas top and bows are modified. A single top extending sufficiently far forward to cover the driver is considered unsuitable, for it causes a strong draft of air to pass right through the truck. Thus a canvas partition is put up back of the driver's seat, a mica window being placed in this partition so that the driver has a rear view. In some cases a separate top is made for the driver, similar to that on a runabout car, thus giving the driver protection whether the top over the load is maintained in position or not. To complete the protection, a canvas extension is fitted to the dashboard, and also canvas flaps on the sides. It is the opinion of the military that the bows on the American trucks are too light, for they are given additional rigidity by joining them up with fore and aft battens, half a dozen on each side. In some cases the sides of the canvas tops are lined with wire netting.

## Some French Ideas

In the French subsidy types the bows have to be considerably heavier than those usually fitted to standard American trucks, the idea of the French army authorities being to have sufficient strength to allow stretchers to be carried from the bows. This method of transporting wounded men does not appear to have been very extensively adopted up to the present, although there is no doubt that when the

big advance comes trucks will have to be used as auxiliaries to the ambulance corps.

At the present time the authorities are more interested in fitting up the trucks in such a way that they can carry the greatest number of able-bodied soldiers in the shortest possible time. Thus, every American truck going out of this depot has two central fore and aft seats, capable of taking twenty to twenty-four men back to back. Four stout wood uprights are secured to each side of the stake body. These uprights are grooved to receive four transverse planks, dividing the body into three equal sections. On these transverse pieces are laid the two fore and aft seats, each one about a couple of inches from the center line of the vehicle.

## Comfortable Seats Provided

In this way the men are seated in two rows down the center of the vehicle, they have plenty of leg room, and ample space at their feet for placing their kit and rifle. This use of the trucks is another reason for putting up a complete partition just back of the driver. Without it the men would be subject to a strong current of air and in dry weather enveloped in a cloud of dust.

The tint of canvas employed by some of the American truck manufacturers is altogether unsuitable for war purposes. Whereas the gray bodies are invisible at a distance of a few hundred yards, the yellow canvas tops can be picked out several miles away. On this account some of the tops are painted gray before the trucks go out of the depot, but there does not appear



to be any invariable rule with regard to this, the matter evidently being left in the hands of the individual officers in charge of the convoys. As it is the intention of the staff to make a big use of army trucks to shift men rapidly from point to point, when attacks on a large scale are being carried out, it is obviously necessary that the vehicles should be as invisible as possible to the enemy's scouts and aeroplane pilots. For European service a green or greenish-gray tint is most suitable.

The space available for tools, spares, and driver's kit is found to be rather limited on nearly all the American trucks. A box which is suitable and sufficient for civilian service is deficient for the use of men who have to be away from a permanent depot for several weeks at a time. The most suitable plan is to fix a big box on the side of the chassis, but attached to the portion of the body overhanging the frame members. The face of this box should form the door, with the hinges at the top. A box under the rear of the body, with hinges at the bottom, as supplied by one American maker, is unsuitable for war service, for it is apt to be stove in when maneuvering for positions in crowded railheads, and if the door comes open it will be broken by trailing on the road.

#### How Tools Are Carried

In some cases additional tool and kit chests as described are fitted before the trucks go out. However, where time is important the trucks go out in their original condition and the driver and his mate simply place their kit within the body. The tool box on the Pierce is one of the best of its kind, but this truck would have been improved with a large capacity locker on the left-hand side between the spring hanger and the step. White has fitted a box in the described position, under the body overhang; the only objection that can be made to it is that it is too small for army service.

Very few spare parts are being given to the drivers of American trucks, the parts, indeed, being insignificant in comparison with the spares which are officially demanded on a French subsidy-type truck. The trucks are being sent out with very little more than the kit of tools supplied by the maker. I noticed that each Packard carried a spare driving chain and that a set of non-skid chains was served out to each truck. A length of tow rope is served out to each driver, although the absence of towing hooks on front and rear of some of the American built trucks render towing operations somewhat difficult. Where towing hooks are missing, no attempt is made to fit them, although they are an essential part of every French subsidy type.

The American trucks do not carry sprags, which also are considered essential by the French authorities. In consequence every driver has to take with him a couple of triangular-shaped blocks of wood with which to block the wheels. Before going out, a close inspection is made of all the spares on the truck, the driver having to lay the parts on the ground to the rear of the vehicle and have them checked off individually by one of the officers. With each convoy—usually twenty trucks form a convoy—there is one repair car carrying the parts most likely to be needed on the road.

Some of the earlier French convoys which went into service at the outbreak of the war, had very complete repair wagons, in which a skilled mechanic could tackle almost any job short of a complete

break up. On the later convoys to go out, the repair department is not so elaborate, the intention of the authorities evidently being to have only simple repairs done on the roadside, making use of a permanent repair depot established to the rear of the army, when any extensive work has to be done.

Lighting arrangements on all the American trucks consists of three oil lamps. This is supplemented at the depot by an acetylene headlight with independent generator mounted on the center of the dash. Nearly as much driving is done at night as in daylight hours, and although most of the trips to the trenches have to be made without any light being shown, there are times when it is perfectly safe to show a light and with a good acetylene headlight a considerably higher rate of travel can be maintained. Thus, when men are being brought from the trenches to the rear, the first portion of the journey has usually to be made without lights, while the second portion being out of range of the enemy's guns, can be accomplished with the aid of a headlight. No electric sets are fitted to trucks on service in France; it is doubtful if they would stand up long in the hands of the majority of drivers that are in the service.

Although they do not comply in every respect to what the French consider the mechanical ideal, no attempt whatever is made to modify any of the mechanical details of the American trucks going into French army service. Such changes are unnecessary, even if it were possible to carry them out. American trucks have



BARON JOSEPH DE CRAWHEZ, PIONEER BELGIAN MOTORIST, ACTING AS MECHANIC ON BELGIAN ARMORED CAR



HEAD-ON VIEW OF MORS ARMORED CAR; ALSO SIDE VIEW SHOWING CREW AND GUN

now been in service a sufficient length of time for an opinion to be formed as to their capabilities, and although reserves are made regarding certain makes, the general impression is most favorable.

No truck drivers are now recruited from young drivers eligible for the active army. All drivers are taken from the territorial and auxiliary armies or are volunteers who for various reasons have been liberated from further military service. A young man who began his military training in 1911 or later cannot get into the motor service although he may be a skilled driver and mechanic. While this system

strengthens the front line regiments, it robs the motor section of some good men and increases the proportion of drivers having had very little practical experience before offering themselves for the army. Many of the officers are recruited from the men who have held officer's rank in the army, but owing to age have passed into the territorial ranks or have been released through injuries received in active service. Such officers have to pass a theoretical and practical examination before entering the motor service. No foreigners are allowed to volunteer for the motor section of the French army.

In the central motor depot from which American trucks are drafted to the front, the little repair work necessary is carried out in a motor car workshop once used for taking race horses to Longchamps and Chantilly. The substantial van body with its rear door hinged down so as to form an inclined platform, makes a first-class workshop, while additional space is obtained by having canvas extensions from each side. The repairs here are of a light nature, being mostly attributable to unskilled handling on the trip from the port to depot. The workshop, though, is found to be most useful.

## Now It's Cincinnati That Wants a Motor Speedway

### Business Men Organize to Build a Big Track

CINCINNATI, O., April 12—Talk of a local track which has been going on for some time has resulted in the formation of the Cincinnati Motor Speedway Co., which proposes to construct a 2½-mile speedway, which also will include the usual country club idea.

The organization meeting was held Friday at the Business Men's Club and was presided over by Dr. Charles L. Bonifield, president of the Cincinnati Automobile Club. It was decided to form a stock company with a capitalization of \$5,000 and seven directors were elected. E. W. Ed-

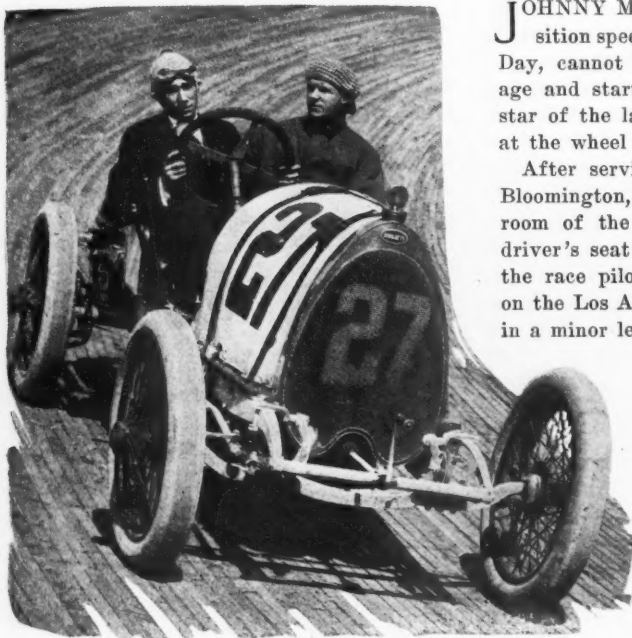
wards, president of the Edwards Mfg. Co., and former president of the Business Men's Club, was chosen president. Among the other officers are James P. Orr, of the Potter Shoe Co.; Julius Freiberg, of the Freiberg Realty Co.; Andreas Burkhardt, of the Burkhardt Co., and George Balch, of the Sinton Hotel Co. All these men belong to the progressive element of the city and their names undoubtedly will inspire confidence in the project.

While the Cincinnati Automobile Club as an organization may not be actively identified with the scheme, Dr. Boni-

field declares that he expects every one of its fifteen members of the board of governors will take stock and assist individually.

Options have been secured on several good tracts of land, but the final decision is up to the board of directors. One that is favored is on the Reading road, which is one of the main highways leading out of Cincinnati. It starts near the courthouse and leads up a valley to the hill-top, where it becomes the main street of Avondale, one of the most fashionable suburbs. From there it runs through Read-

## Race Drivers on Their Way to the Top



JOHNNY MARQUIS, who drove the German Bugatti in the Panama-Pacific exposition speed classics and captured fourth money in the Venice road race St. Patrick's Day, cannot be classed among the neophytes of the sport, for he is 32 years of age and started in pursuit of fortune and fame on the gasoline circuit when the star of the late Lewis Strang was at its zenith, when Strang was scoring victories at the wheel of the Isotta.

After serving as Strang's mechanic for 2 years, Marquis, who was born in Bloomington, Del., and learned the A B C's of motor car construction in the testing room of the old Searchmont Automobile Co., Chester, Pa., moved over into the driver's seat of the Italian speed creation and sought to duplicate the triumphs of the race pilot he had served as oil-pumper. In 1910, he captured several events on the Los Angeles motordrome with the Isotta and in the same car took first money in a minor league road race run at Coalinga, Cal.

The following year, Marquis switched his allegiance to an American car and drove a Stearns in the 24-hour race at Brighton Beach, New York, and in a similar contest staged at Atlanta, Ga.

For two seasons, Strang's former mechanic was veiled in obscurity but he again broke into the sporting pages last year when William Ziegler of New York commissioned him to go to Europe and purchase a racing car for an American campaign. He returned with one of the two English Sunbeams that the scion of the wealthy baking powder manufacturer entered in the 1914 Vanderbilt and grand prize run at Santa Monica. In the Vanderbilt cup pursuit, Marquis broke an axle when leading the field and in the other classic turned over on Death Curve and was injured.

Marquis was hors du combat for the remainder of the 1914 racing season but at the opening of the 1915 speed campaign, said "Good night, nurse," burned his bandages and broke all neutrality laws by accepting the German Bugatti as his mount when its owner, C. W. Fuller of New York and Phoenix, Ariz., offered to back him. Although he failed to finish inside the money at San Francisco, he more than won back his entrance fee at Venice and is in line for an Indianapolis mount.



ing and on to Lebanon, where it connects with another pike leading to Dayton. The Big Four railroad from Cleveland and Columbus passes the proposed site, while the Chicago branch of the Pennsylvania is very near it.

#### OKLAHOMA READY FOR MEET

Oklahoma City, Okla., April 12—With practically every detail now in the hands of various committees and nearing completion, the big 2-day race meet to be held here April 20-22 under the auspices of the Southwest Auto Racing Association now gives promise of being a pronounced success. Members of the association are raising a fund of \$10,000 to put Oklahoma on the gasoline map. In less than an hour after the governor had signed the measure passed by the legislature permitting incorporation of associations organized to conduct motor races the association had obtained a charter from the secretary of state.

In the 200-mile race, to be run April 22, the following cars have been entered: Maxwell, Barney Oldfield; Maxwell, Billy Carlson; Stutz, Earl Cooper; Stutz, Dave Lewis; Peugeot, Bob Burman; Simplex, Louis Disbrow; Case, Eddie Hearne; Case, driver unnamed; Stafford, Albert Strigel; Mercedes, George Clark; Tulsa, A. F. Scott.

The following cars have been named for the 99-mile event for native son drivers, which will be staged April 20: Knox, Earl Swan; Franklin, C. L. McLester; Buick, Jake Strickler; Buick, C. B. Chandler; Overland, Roy Sloan; Mercer, M. J. Main, Jr.; Paige-Detroit, driver unnamed; Weston, Roy Thomas; Studebaker, Charles Schaffstall.

It is planned by the association to make the races an annual affair and for this reason the 2,409-mile course is being worked into the best condition possible. That portion of Linwood boulevard which comprises a part of the track is being resurfaced. The turns on the track have been banked with a 10 per cent grade.

Practice on the race course will begin April 14, a week before the first day's program. The practice will be limited to 2 hours a day.

Local contractors are building a grand stand to accommodate 15,000 people. Circus seats will be secured from Kansas City.

#### STARS SHIP TO OKLAHOMA

Los Angeles, Cal., April 6—Bob Burman, Earl Cooper, Louis Disbrow, Eddie Hearne and Dave Lewis all shipped their cars to Oklahoma City for April 22 event today. The drivers are to follow within the next 2 or 3 days. Burman had intended driving overland in a touring car with his family, but his daughter was taken ill a few days ago and Mrs. Burman will remain in this city to wait until the child has recovered.

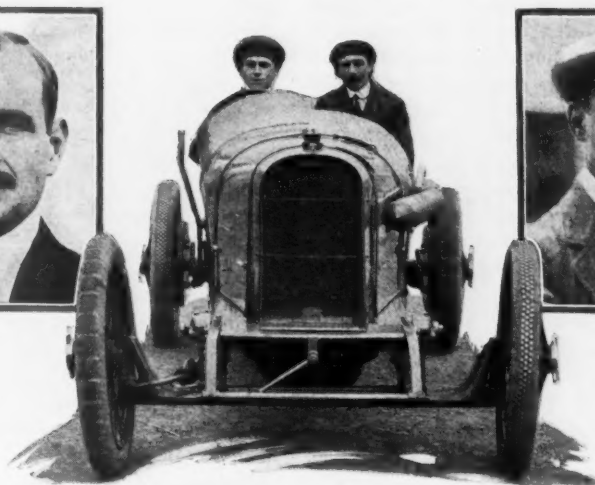
From Oklahoma City, the drivers are to go to Indianapolis, with the exception of Earl Cooper and Dave Lewis.

## Sunbeam Picks Stars for Indianapolis

### Chassagne and Porporato to Drive



JEAN  
CHASSAGNE



J. PORPORATO

ENGINEER COATALEN IN SUNBEAM THAT WILL BE AT INDIANAPOLIS

NEW YORK, April 9—America may not have the opportunity to see Louis Coatalen, the Sunbeam engineer at the wheel of the English car this summer, if rumors in racing circles here prove correct. Instead, it is expected that the two cars which the Sunbeam factory will send across the Atlantic to make their debut at the Indianapolis speedway next month will be piloted by the Italian, Porporato, and Jean Chassagne, already well known to American racing enthusiasts. It is thought probable that Coatalen's military activities may prevent his appearance in the sweepstakes.

The two cars which are being built for the American event on May 29 are well along toward completion, according to advices from the other side, and will be similar in design to those built for the French Grand Prix at Lyons last July. Those cars showed a speed of 110 miles per hour on Brooklands track, and no doubt this will be equalled by the new racers. Consequently they will in all probability have all the speed that will be needed.

The motor is a 3.7 by 6.2 four-cylinder of extremely high-speed type. There are four valves in each cylinder and all overhead, operated by two camshafts, arranged directly over the valves. No rockers are used, but the cams operate the valves through short straight pushrods, which are exceptionally light.

The four valves are so light that springs of only moderate strength are required, this being in strong contrast to the heavy springs that would be necessary for a pair of valves giving the same area of opening as the four small ones. The camshafts are driven by a train of spur gears contained in a case on the front end of the cylinder block, ball bearings being used to simplify the lubrication.

Ball bearings are used also for the crankshaft, and the shaft is made in two halves to permit the easy mounting of the center bearing. Lubrication of these bearings is easy, of course, and the only points requiring special care in this respect are the connecting rods. For taking oil to these under some pressure a ring is attached to each crank web and oil is squirted into the channel thus created. From one side of the ring a hole is drilled through the crankpin so lubricant is delivered to the bush by centrifugal force. The pressure induced when the motor is running fast is quite considerable. The oil is fed by air pressure from a dashboard tank and returned thereto by a pump which keeps the crankcase always empty.

The type of piston favored by the Sunbeam engineer is made entirely of steel. In the center of the head a "leg" is inserted, the lower extremity resting upon the center of the piston pin, the idea of this being to carry off heat from the piston head as well as to support it.

In the chassis there are no departures from standard Sunbeam practice. The clutch is a cone, faced with woven fabric, the gearset provides four speeds and the rear axle is bevel driven. There is a differential, as experiment on the track and on the road has convinced the designers that the solid type of rear axle is dangerous to the driver if a rear tire should deflate. The springs are half elliptic, and very long, and the brakes are in accordance with European practice—one on the transmission and a pair of expanding pattern in the rear wheels.

# Jitney Bus Is Given the Acid Test at Kansas City

## New Transportation Service Overcomes Many Obstacles

KANSAS CITY, Mo., April 12—Three months ago the big cities of the east began hearing of a remarkable system of motor transportation that suddenly had appeared as if by magic in the Pacific coast cities. From there it jumped to the cities of Texas and then to Kansas City and the middle west. On it went, sometimes with a rush; especially in those cities where street car companies had herded their patrons into cars like cattle while in other cities it appeared in a more desultory fashion.

The jitney fever broke out in the early winter in the coast states and Christmas found it with a foothold in Texas. Reports from Los Angeles last week said 1,200 cars were in operation there and the southern cities were all winter breeding grounds for the 5-cent motor passenger carriers. With the advent of warm weather in the more northern states, it is possible the same development will result there.

So far the jitney numbers have increased in the direct ratio to climate and city ordinances. Where the days have been warmest and the laws the least rigorous, the jitney numbers have increased the most rapidly, which doesn't mean, however, that the business has been established on a successful business basis. There are many other considerations to be taken into account, but as conditions differ in various cities, it is to be expected that the new industry will show different degrees of prosperity.

### Kansas City's Experience

Perhaps the jitney experiment in Kansas City will serve as well as any other upon which to base observations as to the future of this mode of transportation. Kansas City has had the jitneys for 3 months, the first cars having been in operation since January 18. The weather since that time has been uniformly bad until the last few days. It has been cold and dreary and much of the time snow has been on the ground. The streets have been in a miserable condition, due to worn-out pavement, and the car that operated without side curtains up and for much of the time chains on the wheels, could not expect to do business.

In addition, the jitney owners were harassed and discouraged by a series of council committee meetings that began with the expressed determination of regulating the jitney cars so that the new method of travel would be safe. The city counselor who has helped to draw a franchise for the Metropolitan Street Railway Co. here, giving that bankrupt company a 30-year franchise, gave the committee a draft of an ordinance to work upon for jitney regulation. The entire city administration and both houses of the coun-

cil are said to be friendly to the Metropolitan and it was realized that unless public sentiment came to the rescue, the jitney would be choked to death. A rather discouraging condition in which to develop a budding industry, yet one which in more or less degree has confronted the jitney wherever it has appeared. In some cities the jitney has crept into political campaigns, candidates standing for or against the new method of transportation.

### Ordinance Held Up

Now in Kansas City, the council has not yet acted and this danger still hangs over the jitney, but the motor car dealers, the jitney owners themselves and the labor unions have showed a strong enough front to hold the proposed ordinance up indefinitely. This ordinance proposed a \$5,000 to \$10,000 liability bond depending upon the size of the car; a license tax of from \$5 to \$10, depending upon the size of the car; a 15-minute schedule; the obtaining of special permission from the park board for jitneys to cross boulevards and special permission from the board of public works to use the streets. The liability bond would cost not less than \$150 a year for the smallest case, if obtainable at all, although one or two companies have announced they would write jitney insurance at that price. And one good-sized company is doing so in Los Angeles.

On the other hand, the jitney drivers have had in their favor, which has acted as a development in their business, an almost intolerable street car congestion, slow transit and admirable newspaper support. Police regulation has not been severe.

These conditions must be fully understood to be able to draw conclusions as to the future of the business.

Now bearing all these things in mind we come to what the actual development has been and what the future holds out.

The first week with bad snowy weather found sixty cars in operation. These cars made short hauls mostly, from the union station to the retail district; from the wholesale district to the wholesale district and from 2 to 3 miles out on the various street car lines into the residence districts. The cars ranged from the cheapest touring cars to the highest priced, although none of the high-priced cars was new. Most of them were very badly used and abused cars. Some of the cheaper cars were new. After the first week the bus made its appearance. They were of all types. Some of them were moving vans with solid tires. These lasted only a few days. The people would not ride in them so that the matter of income and cost of operation on these is useless so

far as the public is concerned. Some of the buses were home-made bodies on touring car chassis. Some seated six passengers on a Ford body. Some seated ten and twelve persons and some seated as high as twenty. Some had long routes and some short ones.

The class of drivers and owners has varied as greatly as the condition of the cars. Some have been careful business-like men, sobered by families. Others, and these have been in the large majority, have been careless, irresponsible men who thought driving a jitney lots of fun and an easy way to fortune. These men have had accidents, breakdowns, police arrests and many of them have been a peril to traffic generally. And many of them have been forced out of business already as a result.

The number of jitneys, sixty the first week, increased during the cold weather to 150 at one time and then dwindled on the coldest days to half that number. Warmer days brought many of them back and now there are 350 cars operating. A month of pleasant spring weather may see the number up to 600 or more.

After 3 months of operation, by careful investigation it is found that of the first 100 jitneys in operation, fifty-six still are paying their dues of \$1 a week to the central organization at the uptown terminal and are in service the greater part of the time. Twenty-six of the first 100 have been in operation almost constantly.

In getting at the future of the business only the fifty-six of the first hundred need be considered. Perhaps it will be best to consider only the twenty-six that have been on the job faithfully. If the business has a future it will be men of the type of the twenty-six that will place it there. Now what are their qualifications and what have they proved?

### Statistics Hard to Get

A representative of Motor Age talked to a half dozen of these men. They had various types of machines from the small touring car to the twelve-passenger bus. Nearly all of them had hazy ideas of the cost of running their cars and all their figures differed.

It would be more or less useless to give the figures of earnings of the various kinds of touring cars and buses. But it will be illuminating to take the bus that has apparently been the most profitable and the touring car that apparently has been the most profitable and from that estimate their chance of success.

Consider the case of Charles Thomas, who starts into business with a twelve-passenger bus on a straight haul without bad hills and a 2½-mile trip. The round trip is 5 miles. Thomas averages two trips an hour and drives from 7 a. m. to



7:30 p. m., sometimes making an extra trip. He will average 125 miles a day. His bus has been in service 41 days. He has worn out two sets of 35 by 5 back tires and one set of front tires practically. He figures his tire expense in that time at \$150 in round numbers. He figures his oil and gas in that time has cost him \$61.50, about \$1.50 a day. He figures a new bus in 2 years at a cost of \$1,300 and allows \$2.50 for a repair and new car fund. This figures nearly \$8 not counting licenses, accidents, insurance—of which he has none and incidentals. Since he started with 21 days of cold weather and the rest of fair weather, he has averaged \$13 a day. He has averaged on the pleasant days as high as \$19 a day. Thomas says he can make his bus pay and pay \$150 a year for insurance and \$50 for license tags.

#### Idea for Twelve-Passenger Bus

Now every bus is a modification of the Thomas bus. Some run farther and the driver may not be as smart a chap as Thomas or so energetic. But almost to a man the ten and twelve-passenger light buses appear to be making from \$3 to \$8 a day. Some of the drivers are creating a sinking fund. Others will live themselves out of business and in a year or so will have neither car nor money to buy a new one. This twelve-passenger jitney which seems to be first choice and which the new jitney company here formed by W. H. Miller, father of the jitney service, has put its faith in to the extent of ordering forty buses, embraces these specifications:

#### CHASSIS

|                              |  |
|------------------------------|--|
| Frame, length .....          | 170  |
| Frame, width .....           | 30   |
| Frame, channel section ..... | 36 1/4   |
| Frame, overhang .....        | 8 3/4  |
| Body, overhang .....         | Semi-elliptic                                  |
| Front springs .....          | Elliptic                                       |
| Rear springs .....           | 116  |
| Wheelbase .....              | 3 1/2 x 5                                      |
| Size motor .....             | 4 in block                                     |
| Number of cylinders .....    | Three-bearing                                  |
| Crankshaft .....             | Cast iron                                      |
| Crankcase .....              | Storage battery and distributor                |
| Ignition .....               | Electric                                       |
| Starter .....                | Cone leather faced                             |
| Clutch .....                 | L. H. steer, central control                   |
| Control .....                | Worm and gear irreversible                     |
| Steering gear .....          | 17-inch diameter                               |
| Steering wheel .....         | Steel stamping                                 |
| Rear axle housing .....      | Full floating                                  |
| Rear axle type .....         | Timken   |
| Rear axle bearing .....      | Timken   |
| Transmission .....           | Selective sliding, direct drive on third speed |
| Ratio .....                  | 4.6 to 1                                       |
| Transmission case .....      | Aluminum on rear axle                          |
| Brakes .....                 | Hand brake, external contracting               |
| Brake drum .....             | Bolted to spokes                               |
| Front axle .....             | Drop forged I-beam section                     |
| Front axle bearings .....    | Timken   |
| Wheels .....                 | Wood artillery                                 |
| Rims .....                   | Demountable quick detachable                   |
| Tires .....                  | 35x5 safety tread, rear; plain, front          |
| Weight complete .....        | 3,400  |
| Capacity .....               | 2,000  |

#### BODY

|                                   |                                 |
|-----------------------------------|---------------------------------|
| Length inside .....               | 131                             |
| Width inside .....                | 59                              |
| Height inside .....               | 65                              |
| Capacity .....                    | 13, including driver            |
| Seats arranged .....              | Lengthwise                      |
| Entrance and exit .....           | Front right side,               |
| door operated by driver from seat |                                 |
| Type .....                        | Pay-as-you-enter                |
| Upholstery .....                  | Leather                         |
| Lights .....                      | Two electric dome lights        |
| Finish .....                      | Olive green, gold striping with |
| black moulding; red wheels        |                                 |
| Coin box .....                    | Street car design               |
| Price complete .....              | \$12,235                        |

This bus is fitted with glass windows which may be unscrewed and removed in

the summer time and curtains roll down for protection from rains and storms. The window is opened by the driver by means of a lever and the coin box is on the door, into which the passenger drops a nickel.

This bus is not built on a pleasure car chassis, but is designed especially for the use to which it will be put and should be good for 150,000 miles, and last 2 or 3 years in the jitney service, it is estimated.

There still is much to be learned about the profits of the jitney business. So far the biggest receipts of 1 day have been \$31.25 for one bus, running from 7 o'clock in the morning until 11 o'clock at night, with 4 hours of idleness at slack traffic hours. The lowest mark for a day's work is below \$5.

The general average for the buses has been about \$10 a day under the worst circumstances of weather and other conditions. The average of the little jitney is much less.

Frank Mulkey, who has been driving a Ford since January 24, has kept accurate account of his expenses and receipts in March. He runs 2 1/2 miles, paralleling a street car line and works from 7 o'clock until 7:30 each day. On Sunday he only handles special trips and then but infrequently. Twenty days in March show that he took in \$153.20. His expenses for gasoline, oil, garage rent, jitney association dues and repairs were \$49.78. The net was \$103.42, or approximately \$5 a day. Of this he charges off \$1.50 a day for depreciation on tires and car, leaving \$3.50 profits. He quit a \$15 a week job as driver of a truck to go into the business and he expresses entire satisfaction at the change.

Mulkey knows something of mechanics and takes care of his own car, and thinks it will last more than a year. It was 6 months old when he went into the jitney business. For car depreciation he charges off \$1 a day and for tires 50 cents a day.

#### Speed Makes Money

On the same route with Mr. Mulkey is another man with a Ford, J. Beery, who plans to make at least \$10 a day and who averages nearly \$11, as against Mulkey's \$7.50 average. Beery does this by fast driving, more trips and by jockeying for position. He makes four trips an hour in rush hours, which means over 20 miles an hour including stops. His gasoline and oil bill is about \$1.50 a day, as against Mulkey's 80 cents. Beery either drops several blocks behind the other jitneys on the line or he always leads. Preferably he gets ahead of a street car and picks up the waiting passengers until he gets a load and then he turns over on a street on which there are no car tracks and whisks his car down town at top speed. Speed does it, for he will not carry more than six passengers while Mulkey has carried eleven passengers seated in and hanging on his car. Beery also expects his car to last more than a year. As to tires he is satisfied if they last a

month. He figures that he makes money wearing his tires out quickly, getting the maximum service from the tires per mile and larger profits.

C. C. Meade, manager of the local assembling Ford factory, declares that the Ford cars in the jitney service undoubtedly will last 2 years but he is neutral in regard to sales of cars for the jitney service. We encourage no one to buy our cars for jitneys," he said, "nor do we discourage it."

#### Jitney Still on Trial

The jitney business is still on trial here, but there are certain things which may fairly be said to have proven their impracticability. The stern-wheeler bus has been abandoned. This is the bus with a step on behind, and using a conductor in addition to the driver. These were seven-passenger chassis mostly with hastily made bodies. The objection to them is the unequal weight distribution.

One could go on indefinitely citing figures, but a summary of the situation appears to be this:

The bus driven by a private owner where overhead expense isn't counted, costing less than \$1,500, seating ten to twelve passengers, with oversized tires, and a good route can clear from \$5 to \$10 a day provided: that the owner is a fairly good hand at tinkering in mechanics; that he is industrious and has a fair amount of business acumen. And the same thing may be said of the small car costing less than \$700 new or second-handed, except that the profits will be from \$2 to \$4.

And the hope of the jitney lies in this sort of men. Nine out of ten will fail in the long run but the 10 per cent of successful men will build up the business, provided the legislation is not prohibitive.

No real company has been established in operation here yet to contend with overhead expense and regular schedules. That is a development that is yet to be reached. However, it is plain that the development in the business so far points to the evolution of the jitney touring car into the medium sized bus.

It must not be forgotten that the jitney is cutting into the street car railway receipts everywhere. It may be stated on absolute authority that in Kansas City some days the cost to the Metropolitan has been as high as \$3,000 and that \$1,500 to \$2,000 is the average.

#### START UP IN GRAND RAPIDS

Grand Rapids, Mich., April 11—The local jitney bus owners have formed a temporary organization, W. D. Vandecar, distributor for the Reo and Premier cars, being elected chairman, and Charles H. Lillie, secretary. When the first meeting adjourned sixty-two owners were on the membership list. The principal matter discussed was relative to liability. It was stated by several owners of single cars that liability insurance rates have been raised until they are prohibitive.



*Avenue of cryptomeria trees planted more than 300 years ago between Nikko and Utso-moya, Japan. The trees are all over 100 feet high and the total length of the shady drive is more than 24 miles*

**T**HINKING that the Russo-Japanese war had been the last great conflict which would be fought on earth, as Carnegie had built the big cote for the dove of peace at The Hague, we made a special side-excursion through Manchuria in order to gather impressions to bequeath to our grandchildren.

We looked on the map in vain for Port Arthur, for that historic place now is called Ryojun by the conquering Japanese. But changing the name cannot obliterate the memories and vestiges of the great struggle fought there 10 years ago. The trenches dug through solid granite, the demolished forts and the ghastly mementos of the terrific charge up 203-Meter hill deserved to have served as reminders of the blessing of peace to future statesmen.

#### Japs Fortify Strategic Points

In the famous war museum are collected relics of the struggle which were intended to so bring home "the horrors of modern warfare" that no nation or individual would ever desire another war. But in seeming anticipation of another conflict, the Japs have fortified Golden hill and Tiger's Tail, the commanding positions, even more strongly than the Russians did before them.

The way from Port Arthur up to Mukden through Dairen and Liao-Yang is dotted with points of interest in connection with the late war. Mukden itself is a most inhospitable place in spring. They have dust storms there just as we have snow storms. After a day of sight-seeing during one of these sand-cyclones, one can

# Round the World on Kerosene Through Manchuria, Korea and Japan

*By Edwin P. Kohl*

*Editor's Note—In this installment Mr. Kohl, who made a motor tour of the world in a kerosene-burning Henderson, tells of his experiences in Manchuria, Korea and Japan. Although these are not strictly motoring adventures, still the story of this former University of Wisconsin man will be found most interesting by those who delight in tales of travel.*

no longer hear, smell, taste or see. The sand particles are carried with sufficient velocity to penetrate even heavy clothing. The landscape is blurred as badly by the flying bits of Mother Earth as in a western blizzard. Each night we felt as if some urchin had put a dozen fuzzy caterpillars down the back of our neck.

#### Land of the Morning Calm

Korea, "the Land of the Morning Calm," also has lost its name in favor of Chosen, the new Japanese cognomen. The new name is rather appropriate, too, in view of the clever way in which the Japs have "chosen" to deprive the Koreans of their independence and make it a part of Japan. The Hermit kingdom as such is no more, but the "hermit" inhabitants still are to be seen. The old men dress in nothing but white—which wear makes white look more like a light black—and wear a peculiar kind of Happy Hooligan hats, with ribbons holding them in place tied in a bow under the chin. They never seem to work, but sit from early till late on one spot and smoke their yard-long pipes, looking into space and not appearing even to think. They probably are the originators of the rest cure.

Seoul, now called Keijyo, the capital of old Korea, is about everything that an American city is not. Everybody seems to take literally the Biblical injunction not to worry about the morrow. They lead an easy-going, care-free life, which is an enigma to an American. The city is surrounded by a massive wall, 14 miles in circumference. After we passed out through the city gate into the country districts, the backwardness of the land became even more apparent. The rice fields are still worked by hand with sharp sticks, just as Adam would have done if he had inherited a paddy-field instead of Paradise.

It makes one sleepy to watch their slow, laborious efforts. We never saw a Korean move faster than a slow walk. They would not even step fast to avoid an approaching 'rickisha, preferring to be run over rather than hurry. We fear that with the introduction of motor cars, about 50 years from now, the population will soon be extinct. At any rate, accident insurance companies should bribe motorists to keep out.

After "doing the points of interest to tourists" in true Baedeker style, we

started for the Land of the Rising Sun, better known as Japan. From Fusan to Shimomoseki across the Japan sea is a night's steamer trip. When we set foot in Japan, last country in our around-the-world itinerary, we felt so near back to America that we almost forgot that the broad Pacific still separated us from breakfast foods, grape-juice, trusts, and crooked politics. The 355 per cent duty on tobacco was a good preparation for San Francisco, however.

#### Japan a Paradox

Japan is a paradox. Side by side with the imported western improvements exist the mediaeval mode of living, dress, food, religion and other relics of old Japan. They boast of having made as great strides in civilization during the past 50 years as Europe did in 500, hence, according to the Japanese version, the people would seem to be ten times as intelligent. No matter how high their brilliance may be, their method of sleeping on the floor is rather low-down. It may have its advantages in furniture and chamber-maid bills, but as a



*One of the trenches around Port Arthur, dug by the Japanese through solid granite during the famous siege*



sudden change, it is rather hard on the anatomy of an occidental. The sharp side of a plank is put under the neck as a pillow. The next morning you feel like Mary, queen of Scots, after she was beheaded. In the absence of chairs, one must squat on the floor like a monkey. That may be comfortable enough if you are bow-legged, but we preferred carrying along a camp-stool to having the cramps.

The silk industry is an important one in Japan, but the "factory system" does not prevail. Individual families keep a few silk worms as we would chickens or a canary. They are kept in the same house with the family, where they are fed mulberry leaves and allowed to spin their cocoons of silk. On our first night in Japan, we had the silk-worm room assigned to us for our bedchamber and could hardly sleep because of the noise of the worms crunching the mulberry leaves and spinning.

Shintoism is the national religion of Japan, but it really is more of a reverence for the mikado than a religion. The temples are in marked contrast with those in China by their good state of repair and the fact that new ones still are being built. Their age cannot be judged by the squeakiness of the floor, for they are purposely so built that the squeak may inform the idols of the approach of a worshipper. The country about Nara and Kyoto is dotted with sacred shrines. Wherever a martyr lost a wishbone or a saint turned a hand-spring, some edifice is erected, and the crafty guides drag the poor foreign tourist around to all of them—at so much per. At Nara are hundreds of tame sacred deer which are worshipped. It seems a shame to have all that good venison go to waste when goats would seem to answer the purpose just as well.

#### Sightseeing in Kyoto

"Rome one can see in a day, but for Kyoto, at least 3 weeks should be allowed," says the guide book, and "the longer the better," echoes back the 'rickisha men, guides, shopkeepers and hotel men. It is true, in Kyoto, the old capital of the country, there are hundreds of temples, but they have about as much significance to the average American as next year's style of motor cars has to a Japanese coolie. After making the rounds in orthodox style for a week, pagodas, priests, temples and Buddha images all merge in one blur. An American woman at our hotel became ill after "doing temples" day after day, but confessed that at home she went to church only on Christmas and Easter. Verily, verily, ugly, distorted idols have powers to charm.

Christian missionaries and the Y. M. C. A. are doing laudable work here, not merely in religious but social uplift by inculcating higher standards of morality, which the country seems sadly in need of. It was an inspiration to see the hundreds of eager young faces in the mission schools. The converts are proud of their new alle-

giance, too, for boys frequently introduced themselves to us at unexpected moments merely in order to get an opportunity to tell us in their broken English that they were "Clisthens."

In the famous mediaeval castle at Osaka, a division of the Japanese army has its headquarters. One of the stones in its walls is 40 feet by 10 feet by 6 feet, the largest in the world, next to those in Baalbek near Damascus. No sooner had we taken a picture of it than a squad of soldiers appeared from nowhere and took us in custody for photographing on military grounds. They acted in a most friendly manner and insisted that we were not their prisoners but their guests, at the same time keeping their gun-barrels so close to our noses that we could smell the powder. Their oriental hypocrisy made us feel like starting the American-Japanese war then and there.

After being marched before every petty officer in the garrison, we were put

cient system of watching the movements of suspicious foreigners, we had about as much chance of eluding them as a gasoline-soaked dog with tallow legs has in chasing an asbestos cat through a forest fire.

#### Cormorant Fishing Interesting

At Nagoya, there is another old castle on the roof of which are two great solid gold dolphins. Attempts having been made to steal them by means of kites and balloons, strong wire netting has been stretched all around them. If that sounds like a fish story, follow us to the Nagara river, a few miles distant, and we will introduce you to cormorant fishing. You will see a dozen hawk-like looking birds, called cormorants, sitting in two rows on the sides of a boat which a fisherman is rowing along the stream. Suddenly one of the birds will make a dive and return to the boat with a liberal-sized fish in its beak. But the thoughtful fisherman has slipped a ring about the cormorant's beek so that it cannot swallow its prey. He



Japanese school boys in Sinwayama park, Tokyo, after having just finished a game of imitation football

through the third degree before "buttons and gold braid" himself. A proper answer to every question he asked us would make a rival to the Encyclopedia Britannica. He would make a good assistant to St. Peter at the gate. But if our wish is fulfilled, he never will get there. But when we showed him our personal letter of introduction from Secretary of State Bryan himself with his signature attached, the old boy got cold feet and grudgingly let the "American spy" go free.

#### Arouse Japs' Suspicions

We thanked him for his warmth of heart but inwardly wished that that big stone would some day fall on his gouty toe. We are certain that we were shadowed all the rest of the time that we remained in Japan and probably still have a niche in the army's rogues' gallery. Under their effi-

then takes the fish from the bird's mouth and makes it try again.

When they "bite" well, the man is kept busy making the different birds disgorge their half-swallowed catch, but he does not have to waste any time baiting his hook. To the American trout-fisher, this may seem too much like buying the fish, but it beats watching a lifeless cork for hours on a hot July day. It is really surprising the amount of fish a dozen cormorants will put in the bottom of a boat in a few hours, and that is all the fisherman is interested in. The Japs do not do anything just for the sport of it.

At the island of Enoshima, we saw some of the Japanese women divers which have been so widely advertised. For ugliness, they beat the idols themselves. We had pictured them to ourselves as graceful sea-nymphs a' la Annette Kellerman, but the

money we threw into the Pacific for them to dive after was literally "thrown away." They put weights on one of the homliest mermaids to prove her prowess in the water, but a southern colonel with us evidently thought they were going to drown her to rid the tourists of her shapeless presence. When she came to the surface again after a long wait, he exclaimed, "Ye gods, they bungled it."

#### Nikko, the Sacred City

No trip to Japan is complete without an excursion to beautiful Nikko, the sacred city, about 150 miles north of Tokyo. We were fortunate in being able to hire a well-known American make of car in which to make the trip. The motor car is about the only thing American which the Japs have not duplicated and manufactured under their own name.

The last score of miles before reaching our destination was between two stately rows of 200 feet high cryptomeria trees planted 300 years ago by royal commands. They are rivaled only by our California giants. The drive under this impressive natural arch was almost solemn in its magnificence. We passed from the massive to the delicate on reaching Nikko by gazing on the exquisitely beautiful wood-carved shrines and mausolea for which the place is world-famous. We were much interested.

The Daiyagawa river passing through the town is spanned by the red-lacquered sacred bridge, which the guide book stated never had been trodden over by anyone except the emperor of Japan himself. The idea of providing such an expensive bridge for such seldom use seemed too absurd to us, viewed from an American business viewpoint. So late that night when all the early-retiring Japs were in bed—we mean on the floor—we sneaked out and walked over the bridge, too. The next morning, the dusty tennis-shoe foot-prints showed so plainly on the high-polished red surface that we omitted the remaining attractions and kept the chauffeur guessing why we were in such a dreadful hurry to get back to Tokyo.

Here we witnessed the funeral of the late empress dowager. Foreigners with permits were given a reserved section along the route where the procession passed. In the minds of the Japanese, the rulers are of divine origin and their death creates a much more profound impression than an American can comprehend. Almost all of Tokyo's 2 million lined the

streets, making a mass of humanity impossible for the eye or the mind to grasp. All the ceremonies were carried on by night with torch-light amidst the wailing of the sad subjects and the solemn booming of cannon. The cortege must have been several miles long. It was one of the most impressive sights we have ever witnessed.

Yoshiwara, the "nightless city," which covers several square miles, is the tenderloin district of Tokyo. A slumming excursion through it at night is a novel experience. We began to think of the New York Bowery as a rather respectable place after wandering here for a few hours.

On this night, a crowd of English sailors on shore leave had taken possession of one of the tea houses. Along came a score of American sailors and they also took a fancy to that house. Then the battle of Bunker Hill was fought over again. The frail Japanese paper house proved a poor fort for the British and soon it was a mass of cursing tars, screaming geisha girls and debris. The experienced Japanese guard-

drawback—the lack of roads. When the motor car made its debut in Europe and America, it found the highways waiting for it and its advent into general use was rapid. But the 'rickisha, kago chair and bullock cart traffic in Japan required only wide paths and the improvement of these into good motor roads will require millions.

#### Good Roads Needed

Under present financial circumstances, the exchequer is not ready to complete such a stupendous task shortly. There are other pressing national needs which must take precedence to constructing even good truck motor roads as from Tokyo to Nakasaki, the western end of the empire. There are some fairly good roads for touring in the more populous districts now, but even these are aggravatingly narrow. The American idea of a 4-rod-wide road would seem a wanton waste of land to the frugal Jap. They cultivate their rice fields so close to the road that a mud bath is often threatened to even a 'rickisha traveler. For safety in country travel, the car ought

to be equipped with outriggers like the boats of the South Sea islanders so that when the car

might accidentally leave the road, it would not sink from sight before a derrick could be summoned. Motoring loses its pleasures when it becomes analogous to tight-rope walking. In most of the interior of Japan, a car would be about as much use in getting about as a pair of Japanese chop-sticks would be in the hands of a hungry American at a banquet.

But as the lighting-rod agent says, we must look to the

future. The country which in half a century passed from feudalism to great factories, electric cars and super-dreadnaughts will not too long hesitate opening the country to the possibilities of motor traffic. Roads will be built by economic pressure and then the boom in cars will be on. If American patent rights will be respected, we ought to get the lion's share of the trade. The much greater transportation expense will almost exclude European competition. Even today, an American car is a relatively more common sight in Tokyo than in London, Berlin or Paris.

The rates of hire for machines varies like everything else in the far east according to how much the seller thinks that the gullible foreigner will "stand for." Taxicab fares are fixed at 60 sen a mile and 20 sen for each additional mile. One hundred sen in 1 yen is equal to 50 cents



*Shinkaicha or Theater street in Kobe, Japan. Nothing appeals to the Japs like melodramatic movies and the billboard illustrations of these, two stories high, make strong men's hearts quiver*

ians of the peace did not call out the police, for all the policemen in Yoshiwara could not have restrained those Yankee jackies with the spirit of '76 aroused in them. But the city fire department directed enough water on the scene to dampen even the spirit of sailors. We did not want to be included among "those taken on the scene" in the police raid that followed, so we bade a hasty farewell.

#### Japan's Motoring Conditions

Turning now to a more practical subject, the Nippon Automobile Club, at its head office in Yokohama, gave us a great deal of information on motoring conditions and possibilities in Japan, some of which may be of interest to Americans. Modern and progressive as Japan is in many matters, the motor car will not be as common throughout the land as other western products for some time due to a fundamental



American money. We found out while in this country.

Motor cars are advertised in Japanese at 5 yen an hour while the tourist pays as close to that figure as he can argue the chauffeur down to.

Before leaving Japan, we motored through the beautiful Hakone district, noted for its charming lake and mountain scenery. We were fortunate in securing a competent Jap driver who had "seen service" in California and naturally drove an American machine. Fortunately for him, however, his passengers knew more about motor mechanics than he did on one occasion or some Detroit manufacturer would have gotten an order for a new car. The tour to Myanoshita, the famous mountain resort, along the old Tokaido—the "national highway" connecting the two capitals, Tokyo and Kyoto—was a trip replete with charms. It was in the spring when all Japan is abloom with flowers.

#### Snow-Capped Mount Fuji

With the deep-blue Pacific to the south, sparkling waterfalls and nestling village interspersing the wild mountain scenery to the north and the pure outlines of snow-capped Mount Fuji, 12,390 feet high, pointing the way to the west, it made a galaxy of natural scenery to be long remembered. Fujiyama is to Japan what windmills are to Holland in art. Its clear-cut reflection in the placid waters of Lake Hakone on a bright morning is the motif for many a Japanese picture and is a fine sight.

In order to penetrate further into the interior, we had to resort to kagos, a kind of basket or hammock suspended from a pole which is carried on the backs of two strong coolies. We were such a heavy load compared with their usual light native passengers that the skirt-clad Japs were soon in short pants. After being carried all rolled up in this human bird-nest for a few hours, we felt that our shape was forever ruined. However, it was bearable after riding in the tonneau on Japanese roads.

To relieve the coolies, we made a little side excursion up the mountains on foot—and got lost. All night, we wandered around to keep from freezing and to try to find a path. The next noon, we stumbled into a little village, near Oji-Koku (Big Hell as we later learned), where few if any white men ever had been before. At any rate, we were hailed as the circus would be in America. Such attentions and homage we had never before received.

## Seeing the Exposition by Motor Train

### Gasoline Solves Transportation Problem

SAN FRANCISCO, Cal., April 10—Seventeen Ford engines are used in the transportation system which is operated within the Panama-Pacific exposition grounds. All day long, seventeen little white motor trains are kept busy hauling exposition visitors from Machinery hall down to the Massachusetts building and back, a distance of 3 miles; and the concession owners say that business is getting better every day with the increased attendance at the fair.

These trains are the invention of R. B. Fageol of Oakland, Cal.; and they are the only means of transportation on the grounds to relieve tired sight-seers. Ford engines form the power plant for the motor proper. The tractor is built on a 36-inch tread and is short in proportion.

The steering wheel is set on the regulation steering post and a single driver's

conductor operates. The wheels are circled by 5 by 25 solid tires and are completely hidden. The trains appear to be gliding rather than rolling, when in motion. It is but a step off the ground to the seat on the train and this is claimed to be an important factor in the popularity of the motor trains.

According to the schedule now in effect, the little cars each average about 100 or 110 miles every day, at a cost of 5 cents per mile which includes mechanical upkeep, depreciation in value and the salaries paid to the drivers and conductors. The fare charged is 10 cents per ride.

Forty passengers per train is a good load, but on opening day and on days when there is some special program at the exposition and the crowds are large, more than fifty passengers have been seen on one train. The entire system is operated by sixty-five men who are employed as drivers and conductors of these trains.

At every exposition an entirely different means of transportation has existed. At the mid-winter fair in San Francisco, the Japanese jinrikisha was used. At the Panama-California exposition at San Diego, Cal., the Electriquette, a motorized reproduction of the wheel chairs which made their first appearance in the Chicago world's fair are used. It is expected these trains will later appear at some

of the big summer resorts on the Atlantic seaboard. They would be particularly useful at Atlantic City.

#### TOUR DATE SETTLED

Denver, Colo., April 9—April 14 has just been decided upon as the date for starting the Pikes Peak Ocean-to-Ocean highway sociability run from Colorado Springs to Indianapolis, Columbus, Chicago and other eastern points. The route has been definitely selected as far as Indianapolis, by way of Calhan, Limon and Burlington, Colorado; Colby, Smith Center, Belleville, Marysville and Hiawatha, Kansas; St. Joseph, Cameron, Chillicothe, Macon and Hannibal, Missouri; Jacksonville, Springfield, Decatur and Chrisman, Illinois, and Rockville and Danville, Indiana. From Indianapolis to Columbus and return, the route has not been decided upon.



*Cormorant fishing near Nagoya, Japan. The cormorants or fish-catching birds sit on the side of the boat until one spies a fish. He dives for it and returns to the boat. But the fisherman has put a ring around the bird's neck so it cannot swallow the fish*

seat is provided on the motor. An intersteering device, one of the inventions of the builder and designer of the trains, is so arranged that by the use of ball and socket draw bar, each car steers the one which follows. When the trains take the curves, there is no skidding. Each car follows in the path of the motor.

The brake shoes work against the surface of the pavement instead of against the wheel or a special brake drum. The automatic brakes have been found to work so well that there is no danger and the motor trains are used with perfect safety among the largest crowds.

Around the grounds, the trains average about 10 miles an hour. Without the cars, the motors are said to be good for 20 miles an hour. The cars, two to the train, are like long settees placed back to back with a passage way between, in which the



# Routes and Touring Information



## Answers to Inquiries for Route Information

### Wichita Falls, Tex.-San Francisco

**W**ICHITA FALLS, Tex.—Editor Motor Age—I notice that Motor Age is routing tourists to California either via Newton, Kas. and the Old Trails route, or central Texas and the Borderland route. I have understood that there is a splendid road from Fort Worth to Las Vegas, through Decatur, Bowie, Wichita Falls, Quanah, Amarillo, and thence to Las Vegas, there striking the Old Trails route. By using this route a person will cut at least 350 miles off his mileage in reaching the trail via Newton, Kan. The writer is contemplating a trip from this point to San Francisco about the middle of April, and proposes traveling the route via Wichita Falls to Las Vegas by way of Amarillo. Will Motor Age tell me if this is feasible?—A Reader.

This is a perfectly feasible route but you do not meet the Old Trails route at Las Vegas, but at Albuquerque. The route from Wichita Falls is over the Colorado-to-Gulf highway, natural prairie roads, good in dry weather, and takes one through Electra, Vernon, Chillicothe, Quanah, Childress, Estelline, Newline, Memphis, Clarendon, Goodnight, Claude, Amarillo; 247 miles.

From Amarillo the route is over good dragged roads, known as the Panhandle Pacific highway, via Canyon, Hereford, Texico, to Clovis, 113 miles; thence over the same highway through House, Santa Rosa, Pastora, Negra, Estancia, Moriarity to Albuquerque, 266 miles.

For the balance of the trip you are referred to the February 25 issue of Motor Age.

### Fort Smith, Ark.-Colorado Springs, Colo.

Fort Smith, Ark.—Editor Motor Age—Kindly give me the best route from Fort Smith, Ark., to Colorado Springs, Colo. Expect to start the first of June.—C. B. Stanton.

Leaving Fort Smith for Kansas City, Mo., route through Winslow, Fayetteville, Springdale, Rogers, Exeter, Fairview, Granby, Diamond, Carthage, thence 161 miles through Jasper, Lamar, Sheldon, Nevada, Butler, Lone Tree, Harrisonville, Peculiar, Kansas City. Here you meet with options, all of which will be in good condition at the time mentioned; we refer you to February 25 issue of Motor Age, which contains a three-colored map together with an article on the different routes to the coast. It is simply a matter of deciding on the sections of the country you desire to see.

### Great Falls, Mont.-San Francisco, Cal.

Great Falls, Mont.—Editor Motor Age—Kindly give me the best route from Great Falls, Mont., to San Francisco by way of Spokane and Seattle, after July 1.—Reader.

Drive to Butte, through Helena and Boulder; thence in a northwesterly direction through Deer Lodge, Clinton, Missoula, St. Regis, Wallace, Coeur d'Alene, Spokane. Should you desire to go to Glacier National park, instead of continuing westward, turn north at Missoula; go through DeSmet, St. Ignatius, Polson, skirting Flat Head lake through Elmo to Kalispell and then on to the park. It will not be necessary to retrace your route to Missoula in order to proceed on your westward journey, for, from the park you can go to Kalispell and then west through Libby, Leona, Bonners Ferry, Sand Point, Rathdrum, Spokane.

From Spokane, the main-traveled highway

is west to Seattle, passing through Reardon, Davenport, Wilbur, Coulee City, Waterville, Wenatchee, Ellensburg, Cleelum, Seattle. This road is known as the Northwest trail, also the National Parks highway. From Seattle, route south on the Pacific highway through Tacoma, Centralia, Kelso, Vancouver, Portland, Oregon City, Salem, Albany, Eugene, Roseburg, Medford, Ashland, Montague, Sisson, Shasta Springs, Redding, Red Bluff, Marysville, Sacramento, Stockton, Tracy, Livermore, Oakland, San Francisco.

It is possible to go from Spokane, south through Rosalie, Colfax and Pomeroy, Walla Walla to Pendleton, thence west through Lexington, Olex, Wasco, The Dalles, and Hood River, where you meet the Columbia highway over which drive to Portland, and then south to San Francisco on the Pacific highway, as outlined above.

### Jacksonville, Fla.-New York City

Cocoa, Fla.—Editor Motor Age—I would like to know the best route from Jacksonville, Fla., to Macon, Ga., also any information as to condition of roads. Also would like to have the best routing from Jacksonville to New York.—J. L. Redmond.

Leaving Jacksonville, route west through McClenny, Sanderson, Olustee, Watertown, Lake City, Houston, Live Oak, Falmouth, Ellaville, Lee, to Valdosta, 142 miles; thence

## Differs With Liewer

**L**ANSING, Mich.—Editor Motor Age—I cannot refrain from registering a vote in opposition to the sentiment expressed by Mr. Liewer in the April 1 issue of Motor Age regarding transcontinental motor touring.

My wife and myself, in a two-passenger roadster, have made two trips from Portland, Me., to San Francisco, and while we appreciate very much the beauties and pleasures of motoring in the White mountains, the Berkshire hills and over the good roads generally to be found in New England, we are much more fascinated with western touring.

Our first trip to the coast was in September, 1913, by way of the Midland trail through Colorado, and upon reaching San Francisco started back the second day by rail, but instead of selling our car on the coast as we had intended when leaving home, we placed it in storage, hoping soon to find time to go out and drive it back. This we did early in 1914, May 1 finding us pulling out of San Francisco for Los Angeles, to return east by the Santa Fe trail. We landed in Lansing May 30 absolutely certain that that particular motor trip was the best one we ever had.

On neither trip, going or coming home, did we at any time carry tackle or a camp outfit, nor did we sleep out on the desert or miss any meals and we are, at the present time, looking up route information for a western trip this summer, expecting to go out over the Northwestern trail and take in Yellowstone park on the way.

After spending all the vacation time we have been able to squeeze out of business during the past 5 or 6 years in touring over twenty-two states, we feel that if we ever do any shipping of our car by rail it will be just to get out of Michigan, as our home state has the poorest roads we have traveled over.—Ray Potter.

to Macon, 150 miles, through Mineola, Adel, Tifton, Chula, Sycamore, Sibley, Vienna, Echeconnee, Macon.

For the routing to New York, from Macon go to Atlanta, 97 miles, through Forsyth, Orchard Hill, Griffin, Jonesboro, Atlanta. To Greenville, 188 miles, route via Scottsdale, Stone Mountain, Snellville, Auburn, Jefferson, Pocataligo, Royston, Lavonia, Anderson, Greenville. From Greenville, the route to Charlotte, N. C., is over macadam roads the greater part of the distance, and the way-points are Duncan, Spartanburg, Gaffney, Kings Mountain, Bessemer City, Lowell, Charlotte.

Heading for Winston-Salem, N. C., you will have to drive 86 miles by way of Concord, Salisbury, Lexington, Brinkleys and Midway. Now going 123 miles through Stokesdale, Madison, Stoneville, Martinsville, Rock Mount you reach Roanoke; continue for 89 miles to Staunton, Va., through Troutville, Natural Bridge, Lexington, and Greenville.

Route next to Winchester, 91 miles, via Harrisonburg, Woodstock, Strasburg, Winchester, thence 81 miles to Washington, D. C., through Berryville, Leesburg, Gaithersburg.

Another route from Winchester to Washington via Hagerstown and Frederick, somewhat longer but which will take you through the battlefield of Antietam, is by way of Berryville, Va.; Charleston, W. Va.; Shepherdstown, Antietam Station, Sharpsburg, Hagerstown; then drop down south to Frederick, 47 miles, through Boonsboro and Braddock Heights, and to Washington, 69 miles, passing Rockville and Bethesda.

All through the Carolinas and the Virginias there are numberless side trips which may be taken with much pleasure; one such trip is the run to Asheville out of Greenville; out of Staunton is the trip to Hot Springs and White Sulphur Springs.

Leaving Washington, and driving to Baltimore, 41 miles of macadam, takes one through Bladensburg, Laurel and Relay. A 100-mile macadam stretch through Carny, Bel Air, Havre de Grace, Newark, Wilmington, Chester and Darby brings one into Philadelphia. From Philadelphia to New York, 97 miles, the way lies by way of Ogontz, Langhorne, Trenton, N. J.; New Brunswick, Metuchen, Rahway, Elizabeth, Newark, Jersey City, Weehawken-West 42nd street ferry, New York.

### San Saba, Tex.-Alpine, Tex.

San Saba, Tex.—Editor Motor Age—Kindly give me the best route from San Saba, Tex., to Alpine, Tex.—E. C. Beaumont.

From San Saba you should go directly west through Brady, northwest to Paint Rock and west to San Angelo. From San Angelo the route is via Knickerbocker, Sherwood, Mertzon, Barnhart, Ozone, Sheeld, Fort Stockton, Alpine. The road follows the railroad from San Angelo to Barnhart, and from this point follows largely the railroad to destination. There are no towns between Fort Stockton and Alpine.

### Chicago-Zanesville, O.

Chicago—Editor Motor Age—Kindly give me information concerning the best route between Chicago and Zanesville, O. Are the roads good and what is the distance?—A. R. Murray.

You have the choice of several good routes between these points, all over good roads



but longer mileage in some cases. The shortest and probably the most direct is via South Bend, Fort Wayne, Lima, and Columbus, a distance of 387 miles. This routing is first to South Bend through South Chicago, Hessville, Gary, Hobart, Wheeler, Valparaiso, Westville, La Porte, New Carlisle, South Bend, 100 miles. Seventy-eight miles of good gravel road through Mishawaka, Goshen, Ligonier, Wolf Lake, Churubusco, will bring you into Fort Wayne, with a run of 63 miles to Lima, O., over gravel road by way of Van Wert and Delphos.

It is 89 miles to Columbus through Holden, Bellefontaine, Marysville, and Dublin; the road is gravel and macadam. Here you have options to Zanesville, 55 miles, one via Newark over fine gravel and macadam through Granville, Newark, Hanover and Nashville to Zanesville, or via the National Old Trails route, going from Columbus through Reynoldsburg, Hebron, Linnville, and Mt. Sterling to Zanesville.

An excellent option from Chicago is through Indianapolis, thence directly east to Zanesville over the National Old Trails road, a total distance of 425 miles as against the 387 miles of the route outlined. Leaving

Chicago this route will take you first to Lafayette, passing the towns of Hessville, Highlands, Schereville, Crown Point, Thayer, Rensselaer, Wolcott, Montmorenci, Lafayette; thence to Indianapolis through Frankfort and Lebanon, 239 miles. Turning east and routing over the National Old Trails road, you should pass through Knightstown, Cambridge City, Richmond, Vandalla, Brandt, Springfield, Summerford, and Alton to Columbus; follow the outline to Zanesville as given in the first routing.

A third option would be to go to South Bend, thence to Cleveland, and south to Zanesville. This route also is an excellent option, the distance being 407 miles.

Blue Book volume 4 covers all of the routes mentioned, as well as other options. Price \$2.50, and can be purchased of the Blue Book Publishing Co., Chicago.

Cassville, Mo.—Mason City, Ia.

Cassville, Mo.—Editor Motor Age—Would like to know the best route from Cassville, Mo., to Mason City, Ia.—C. C. Chandler.

From Cassville drive to Monett, then due north to Kansas City through Lamar, Nevada, Arthur, Butler, Harrisonville, Peculiar. Proceeding north on the Interstate trail, go

first to St. Joseph, 63 miles, via Smithville, Edgerton, Halleck; thence to Des Moines, Ia., on this same trail, 196 miles, through Union Star, King City, Albany, Bethany, Lamoni, Osceola, Medora, Somerset.

Proceed due north for 130 miles to Mason Iowa Falls, Hampton. This is the most direct route. There are several longer options.

Hatfield, Minn.—Marshfield, Wis.

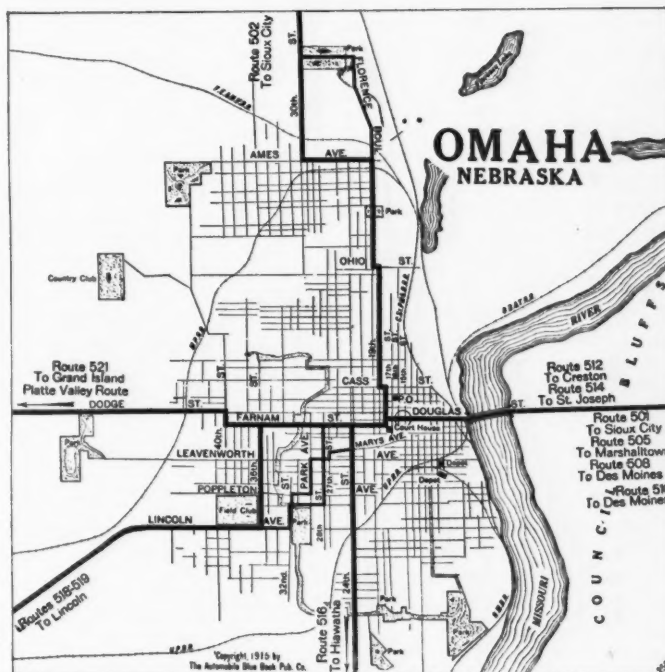
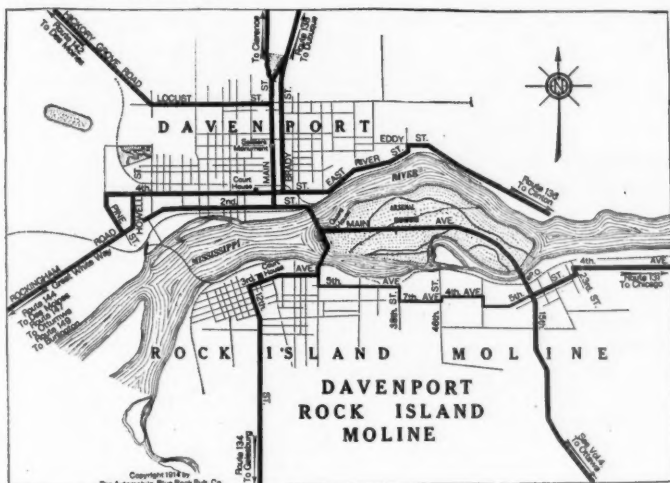
Marshfield, Wis.—Editor Motor Age—Would like to know the best route from Hatfield, Minn., to Marshfield, Wis.—J. M. McDonnell.

Route first to Pipestone, then 93 miles to Redwood Falls through Tyler, Russell, Marshall, Vesta, Redwood Falls. Heading for Minneapolis, drive north to Olivia and east through Island, Hector, Stewart, Sumter, Glencoe, Norwood, Excelsior, Minneapolis.

Driving east to St. Paul, proceed 87 miles to Eau Claire, going through Lakeland, Baldwin, Wilson, Knapp, Menomonie, to Eau Claire over good natural roads; thence to Marshfield by way of Chippewa Falls, Anson, Cadott, Stanley, Thorp, Withee, Loyal and Mannville. Volumes 4 and 5 of the Blue Book cover entire routing.

## For the Guidance of Transcontinental Tourists

Believing that tourists often experience trouble passing through large cities, Motor Age herewith presents the first of a series of maps, all copyrighted by the Automobile Blue Book Publishing Co., showing the best routes through four of the larger cities on the transcontinental trails.





# The Readers' Clearing House



## CONSTRUCTION OF A DIFFERENTIAL Parts of the Maxwell Unit—How Wheels Turn in Opposite Directions

URQUHART, Wis.—Editor Motor Age—Kindly explain the working principle of a differential in a Maxwell 25.

2—Can a mixture of 1 part kerosene and three parts gasoline be used in a Maxwell 25, 1914 model, using a Zephyr carburetor? Would this be economical?

3—Does the Maxwell Motor Co. own the Maxwell racers No. 14 and 17?—J. G. Rudolph.

1—The operation of the differential of the Maxwell 25 is no different from that of any other modern car. In order to fully understand the operation you must have a definite conception of the parts of the unit.

The axle shafts of a live axle have attached to the inner ends some form of bevel gear. In Fig. 4 is shown a differential assembly with the axle shafts and their bevels in place. These bevels, when in position, are in a housing, usually, to which the large driving bevel is attached. The large gear is the one operated by the driving pinion of the propeller shaft.

Between the axle bevels is placed what is called a spider, shown in Fig. 1, and in the Maxwell this spider has three arms. Upon each arm a pinion is mounted freely. The spider with its pinions is held in place, as shown in Fig. 2, in the differential casing. It is possible with a differential for one wheel to turn in one direction and the other in the other direction. When the wheels turn in opposite directions the axle shaft bevels merely spin the spider pinions on their axis. A somewhat similar action would result if you would place a pencil between the palms of the hands and then rub the hands. One hand would go in one direction, the other in the other and the pencil would revolve on an imaginary axis.

When the car is going straight ahead the spider bevels do not revolve on their axis, instead the whole unit revolves, turning the axle bevels. This might be explained by trying to turn the hands with the pencil between them, in the same direction, in which case the pencil will not revolve.

2—It could be used, but gasoline is better.

3—Yes.

### Installing Battery on Ford Car

El Paso, Texas—Editor Motor Age—I wish to install a master vibrator on my Ford car and also use a battery for auxiliary ignition. Please show by diagram how the battery is connected.—R. T.

The illustration in Fig. 3 shows a master vibrator and battery connected in the ignition system. One side of the battery is grounded and the



FIG. 1—MAXWELL DIFFERENTIAL SPIDER  
other side fastened to the battery terminal on the vibrator coil box.

## CHARGING OF STORAGE BATTERIES

### Current Rate Depends Upon Size of the Battery—Maker to Be Consulted

Lebanon, Ill.—Editor Motor Age—We have a Peerless D. C. generator 5 K. W. 120 volts and 40 amperes. Can I charge storage batteries from this generator, say 6-volt batteries?

What voltage and amperage would this 6-volt battery require?—Ed. C. Braun.

You can use your generator for charging storage batteries by connecting the latter in series and placing a rheostat in the line to control the current flow.

The charging rate of a battery depends upon its size. The average 6-volt 60-ampere-hour starting battery should be charged initially at 10 amperes and this tapered off to bring it to about  $3\frac{1}{2}$  amperes at the finish. Lighting batteries and ignition batteries have other charging rates. You should consult with a battery

manufacturer or a maker of charging installations, if you wish to do this work on a large scale.

## WHICH IS BEST SHAFT SUPPORT?

### Two, Three or Five-Bearing Crankshafts —Latter Has Rigidity

St. Libory, Neb.—Editor Motor Age—What are the advantages and disadvantages of the two, three and five-bearing crankshafts? Is a two-bearing crankshaft sufficiently strong to take care of the strain it is subjected to for any length of time?

2—What are the advantages and disadvantages of the gearset mounted on the rear axle and the unit power plant?—A Reader.

1—The five-bearing crankshaft is not necessarily better in every respect than either the three or two-bearing shaft in a four-cylinder motor, although it will be less liable to whip due to its rigid mounting. You will find that the four-cylinder five-bearing motor usually, if not always, has its cylinders cast separately, thus making a comparatively long shaft and motor. With a long shaft the points of support must naturally be many to obtain rigidity and it would not do for a very long motor to have a two-bearing shaft, although some have three large supports. The motor design then plays a big part in the number of bearings to support the crankshaft. The small block motor with a two-bearing crankshaft shows good results and the block and pair-cast motors with three-bearing shafts are also showing up well. Taking the small block motor, any increase in the number of bearings adds to the frictional loss, to the cost and detracts from its simplicity. The bearings usually used in this type are made long to give good service. However, in two motors exactly the same in every respect but crankshaft support and one with two and the other with five-bearings, the latter will in most cases show longer life than the former.

2—This was given in the April 8 issue of Motor Age on page 34.

### Alternating Current Characteristic

Stuart, Ia.—Editor Motor Age—Does the current of a Splitdorf magneto flow in one direction around the circuit every impulse, or does it alternate in direction around the circuit?—G. T.

It alternates many times each second.

### Wiring Ford for Battery Ignition

New Carlisle, O.—Editor Motor Age—How may I wire lights on a Ford to run from a storage battery and at exhaustion of same, switch on magneto current?—An Interested Subscriber.

This is done easily by grounding one side of the battery and

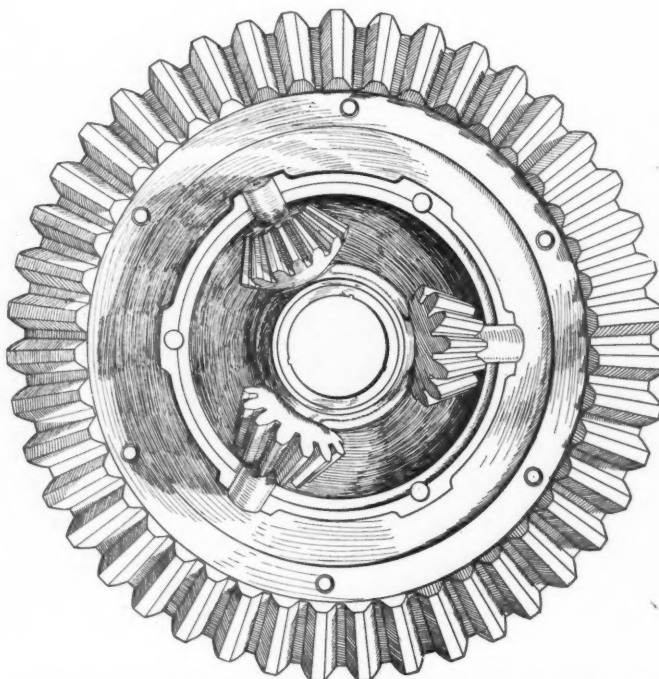


FIG. 2—HOW MAXWELL DIFFERENTIAL SPIDER IS MOUNTED



connecting the other side to the battery terminal of the coil box. The magneto connections should remain unchanged.

### HAS TROUBLE IN SHIFTING GEARS Probably Due to Stoppage of the Clutch— Poor Manipulation

Springport, Mich.—Editor Motor Age—I am having difficulty in mastering the shifting of gears on Oldsmobile 42, as I have heretofore driven a car of planetary type. I can get it up to third speed very well, but when I desire to get back to intermediate or low, for reason of traffic or heavy grade, I cannot get the gear to work as they seem to rub on their points causing an undesirable noise.—Howard V. Allen.

We believe this trouble is caused by the clutch cone being stopped from spinning too quickly, due to imperfect lubrication on the throwout collar. The Olds Motor Works, Lansing, Mich., can supply you with a new clutch gear, having holes drilled to lubricate automatically the square end of the clutch gear, and can send you a blue print showing how holes can be drilled into the clutch hub so the oil will work out through it on to the throwout collar and keep the throwout collar automatically lubricated.

In order to take advantage of this improvement, it will be necessary to use oil instead of grease in the gearset case. They have been building cars as above for some little time and they have been giving better satisfaction than the earlier type, which did not have these holes drilled.

If you do not want to go to the trouble of making these changes, and will squirt 6 or 8 grease cupsful of grease through the cup provided to lubricate the throwout collar, you will obtain better lubrication on it for a time, but it will be only temporary.

### Will Not Pull on Intermediate

Bedford, Ia.—Editor Motor Age—It seems my model C 36 roadster Buick does not pull good on intermediate speed. I have to go to low when I should not. Does Motor Age think it is in the carburetor or in the gears. I use a model L Schebler.—L. V. Woodside.

The trouble is not with the carburetor apparently but with the gearset. The in-

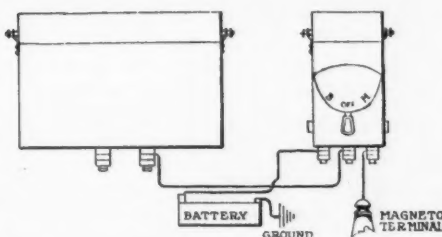


FIG. 3—MASTER VIBRATOR AND BATTERY  
INSTALLED IN A FORD

intermediate speed gear may be binding against the sliding pinion. Have the gearset examined by a mechanic at the nearest Buick service station.

### WANTS RECORD BOOK OF CAR COST Easy Method of Keeping Track of Fuel, Oil and Tire Consumption

Nashville, Tenn.—Editor Motor Age—Kindly advise me if there is a small, simple record book published, and by whom, for recording gasoline used, tire data and lubricating data to be carried in car for easy reference and record.

Could not Motor Age in the near future give us an article along these lines, suggesting simple and clear system or systems for recording this data? I find that a great many drivers think they are getting certain results from gasoline and tires, but few keep an accurate record. It is also astonishing to see how few people keep their engines clean, how different the ordinary power plant engine from the ordinary auto engine, and yet the latter may be worth more than the former, and would respond as nicely to good treatment.—J. G. Creveling, Jr.

Motor Age offers a record book for keeping information concerning fuel, tires, oil, etc. This book is fully described in the accessory department in this issue of Motor Age.

### SPLITDORF COIL ARCS AT POINTS Safety Gap Shows That the Motor Is Mis- firing—Carburetion at Fault

Pardeeville, Wis.—Editor Motor Age—I have an E-M-F 30 that has been misfiring. There are two points on top of the Splitdorf coil box and at times the sparks will fly across these points. Is that a sign that the coil is weak or may it be in the magneto? I have looked the wires over and they are in good shape. It will misfire more on heavy pulling on high gear. On good level roads it will generally pick up and run fine. I use the same carburetor that came with the car, the company's own make. I believe it is in the carburetor and either the magneto or the coil, for when I put on high gear when coming to a little grade and I open the throttle to give it more gas, it will die down quicker than if I left it at a few notches.—Leonard Dalton.

The arcing you mention will always occur when one or more cylinders misfire. The points form a safety gap, which is necessary to prevent injury to the coil. Motor Age believes your trouble is in the carburetion system and it is probable the carburetor is adjusted poorly and that there are leaks about the inlet manifold and other joints in the cylinders.

### No Peugeot Eights Here

Treichlers, Pa.—Editor Motor Age—Is the Peugeot, driven by Resta in the Vanderbilt race, an eight-cylinder car?—G. B. Mauser.

No. All the Peugeot racing cars that have appeared in America are four-cylinder cars.

### Types of Motors Used

Milwaukee, Wis.—Editor Motor Age—Please show sections of the most used motors such as L-head and T-head, etc., bringing out the location of the valves.—D. P. D.

Four motor types are shown in Fig. 6. The first is the L-head, which is used more than any other type at present. The

T-head has a fair percentage of followers and so has the valve-in-the-head. The last illustration shows a type of L-head cylinder, with one valve in the head and the other in the side.

### SHORT OR LONG INLET MANIFOLD Former Gives Better All-Round Results— Reasons for This

Belleville, Kan.—Editor Motor Age—Kindly tell me something about long and short intake manifolds. Which is best?—Dr. Edw. Sharp.

The short manifold usually is better showing superior results at low speeds with wide-open throttle and equally as good results at high speeds. When the throttle is wide open at slow speeds, a condition existing when the car is on a heavy pull, the liquid gasoline in the manifold must be lifted a greater height in the long manifold and hence there is a chance of loading up, due to the liquid fuel dropping back against the throttle. The condition really is caused by the air velocity being insufficient to carry the fuel to the motor. With a short manifold the fuel need not be lifted very high and hence there will be no loading up or collecting of gasoline in the manifold.

### Winner of 100-Mile Race

New London, Ind.—Editor Motor Age—What machine and driver won the 100-mile race in 1910 at Indianapolis?—A Reader.

Kineaid, in a National, won the 100-mile event in the 1910 meet at Indianapolis. His time was 1:23:43 and it now stands as a speedway record for cars of 301 to 450 cubic inches displacement.

### White Has Simple Control

Aurora, Ill.—Editor Motor Age—I understand that the 1915 White cars use a form of centralized control. Where is the unit located and what does it control?—A Subscriber.

The White control unit is shown in Fig. 5, mounted on the steering post directly

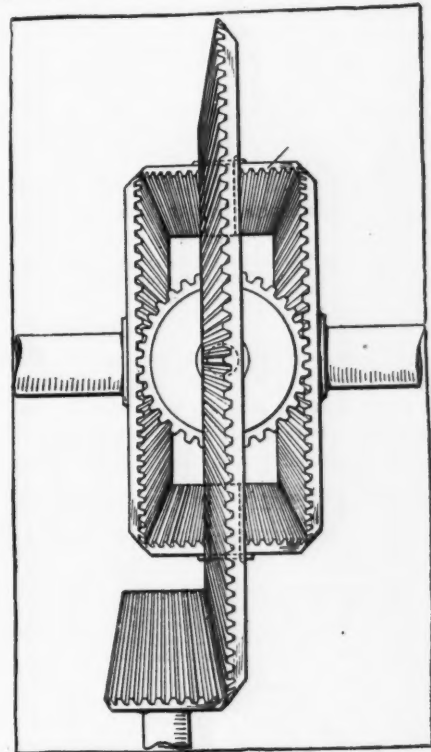


FIG. 4—PARTS OF A DIFFERENTIAL UNIT  
WITH AXLES IN PLACE

### Questions Answered and Communi- cations Received

J. G. Randolph ..... Urquhart, Wis.  
R. T. .... El Paso, Tex.  
Ed. C. Braun ..... Lebanon, Ill.  
A Reader ..... St. Libory, Neb.  
G. T. .... Stuart, Ia.  
An Interested Subscriber ..... New Carlisle, O.  
Howard V. Allen ..... Springport, Mich.  
L. V. Woodside ..... Bedford, Ia.  
Leonard Dalton ..... Pardeeville, Wis.  
J. G. Creveling, Jr. .... Nashville, Tenn.  
G. B. Mauser ..... Treichlers, Pa.  
D. P. D. .... Milwaukee, Wis.  
Frank Dennis ..... Jewett, Ohio  
A Subscriber ..... Aurora, Ill.  
Dr. F. O. Lander ..... Knoxville, Ill.  
A Reader ..... New London, Ind.  
J. S. Wells ..... Gaffney, S. C.  
Dr. Edw. Sharp ..... Belleville, Kan.  
C. C. M. .... Norman, Neb.  
A Subscriber ..... Grandin, N. D.  
J. B. McQuenny ..... Chicago, Ill.  
Frank R. Mayer ..... Washington, Ia.  
D. K. Kempton ..... Corning, Cal.  
Hiram Davis ..... Louisville, Miss.  
A Subscriber ..... Good Hope, Ill.  
R. G. Everist ..... Waumandee, Wis.  
Stronghurst, Ill. .... Ed. Stine  
Hebron, Ill. .... J. S. Losee  
Hamburg, Ill. .... A. F. Buchanan

No communications not signed with the writer's full name and address will be answered.

below the wheel. The illustration also shows both sides of the unit. One side controls the lights by means of a simple switch and the other the ignition. There is a small lighting bulb at the bottom of the control unit.

### THE MOTOR MISFIRES ON A COAST Loading Up in the Inlet Manifold Probable Cause of Trouble

Knoxville, Ill.—I have a Haynes model 20 that will not fire at all speeds. It will not idle properly but can be throttled down to about 10 or 15 miles while pulling, after getting up to about 20 miles, it starts misfiring, until 30 miles an hour is reached, then it fires on all four cylinders but on slowing down and speeding up again it will miss and run on about two cylinders. This miss does not seem to be a regular one but one that is caused by the carbureter loading up or an improper adjustment of breaker points. We have tried both Schebler and Stromberg B. The magneto is a Bosch D U-4 with both battery and magneto breaker points in good condition and no adjustment on either one clears up the trouble. We have tried several valve adjustments both loose and close. The engine lately has been taken down and was put together according to the marking on the timing gears and the valve and ignition check with the markings on flywheel. The compression is fair, new piston rings have been used throughout and valves ground in. The valve guides are worn down allowing quite a little play on three of them. Would this cause the trouble? If so, how can this be remedied as they are not bushed?

2—Will you also tell me if there is a radiator leak compound that will repair a small leak and not injure the radiator.—Dr. F. O. Lander.

1—The trouble no doubt is due to loading up in the inlet manifold and this will be especially true when the car is under a heavy load. Primarily, the loading up is caused by a reduction in air velocity in the manifold. Motor Age believes air leaks about the manifold and valve stem guides, etc., are creating the drop in air velocity. You might try valves with over-size stems or have a good mechanic fit bronze bushings for the guides.

2—There are a number of radiator compounds on the market which are effective. Motor Age is sending you a list of these.

### HIGH-TENSION MAGNETO FEATURE All Round Results Better Than the Low-Tension

Gaffney, S. C.—Editor Motor Age—What are the advantages and disadvantages of the low-tension and the high-tension magnetos in regard to both starting and service on a car?—J. S. Wells.

The average high-tension magneto will give a spark of higher heat value than the low-tension, that is, one using an outside coil. Both types show up equally well in starting and in service.

### IS INTERESTED IN FUEL FEEDS Asks About Pressure and Gravity—Does the Former Give Trouble?

Jewett, Ohio—Editor Motor Age—Is a light car, driving through the springs without braces to the rear axle other than the torsion tube as strong and satisfactory as one driving through radius rod or torsion arm when subject to hard service on bad roads with steep hills with bad brakes and deep sand in places?

2—Is pressure feed tank on rear of car troublesome? Is it likely to give trouble in a year or 2 or in time?

3—What are the advantages of pressure feed over gravity with tank under the cowl other than safety from fire?—Frank Dennis.

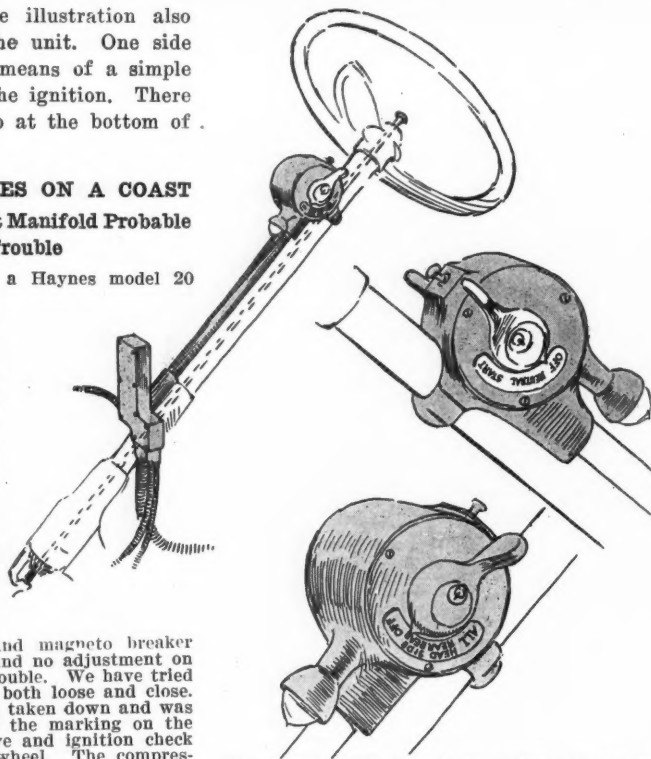


FIG. 5—STEERING POST CONTROL UNIT ON 1915 WHITE CARS

1—They will show about the same results. A lot depends upon the particular construction.

2—Some types of pressure-feed system give trouble, mainly due to leaks in the line.

3—The greatest advantage of the pressure feed over that mentioned is the better fuel feed obtained on grades. Also all the fuel in the tank may be used, whereas with some gravity feeds there will be variations in the rate of flow when the tank is nearly empty.

### NUMBER OF CRANK BEARINGS USED Three-Bearing Shafts Predominate—List Published in Motor Age

Chicago—Editor Motor Age—What other four-cylinder American cars, besides the Overland, use five bearings in the crankshaft? What cars use three?

2—What American eight-cylinder cars use five bearings? What cars use three? What American stock sixes use seven bearings? What ones use three?

4—With all the novelties in racing cars, which afterward become incorporated in stock cars, I am surprised that such a crankshaft as that of the 1914 Maxwell racer, with small counter-balanced flywheels built into the crankshaft, is not used in stock cars. What would be the additional cost if the stock Maxwells were so equipped?

I note in Motor Age issue of December 24 that L. M. Stewart of Louisville, Ky., worries about the amount of gasoline consumed while using the motor as a brake. Judging from the number of plausible advertisements in many of the publications I should judge there is no good reason why there should be any gasoline consumption whatever under such circumstances, for these advertisements set forth quite reasonably that a hand-operated extra air inlet makes such waste of gasoline entirely unnecessary and undesirable from any standpoint whatever.

5—I am aware of the fact that the two-cycle engine has been little used in motor car work, but the high-speed two-cycle engine has in this country been used very extensively and successfully in aviation. With the lubrication being entirely oil mixed with the gas, what would be the proper proportions for mixing castor oil with gasoline for the high-speed two-cycle engine?—J. B. McQueeney.

1—In the December 31 issue of Motor Age, on pages 33 to 41, you will find specifications of the 1915 American motor cars

with the number and type of crankshaft bearings used.

2—Practically all of them use three bearings. Motor Age knows of none using five bearings.

3—It is hard to say what the additional cost would be, but it certainly would be too high for the present selling price of the car. It is not necessary except for high-speed work.

4—You can use a gasoline to oil proportion of 20 to 1 and get good results.

### CARBURETER ADJUSTMENT HINTS Number of Turns of Needle Makes Little Difference—Use Hot Air

Grandin, N. D.—Editor Motor Age—In the March 4 issue of Motor Age was given the method of adjusting a Schebler model L. On my car I cannot open the needle valve with more than one complete turn with the air valve seating lightly and the dial adjustment the same as you give. In some other adjustments you give from three to five turns of the valve. Where is the difference? It is on a Northway motor 4½x4½ and 1½ inch carburetor.

2—Can the carbureter be connected up with the exhaust and heated with good results?

3—Would it have to be lead to the outside of the car?—A Subscriber.

1—There is nothing wrong with your carbureter, as it may be necessary to seat the needle completely with five turns in one carbureter and with one in the other. Merely adjust the needle to get the proper mixture and forget the number of turns.

2—A hot-air connection from around the exhaust pipe certainly will be worth while. The installation is easy to make and you can purchase sufficient tubing and a stove for about \$2. The Schebler company will supply the necessary parts.

3—No. All of it is installed under the hood.

### BRAKES ON A FORD CAR CHATTER Trouble Due to Bands Being Glazed—Carbureter Needle Needs Reseating

Norman, Neb.—Editor Motor Age—I am having trouble with the brake on my 1913 Ford car. The brake lining is not worn out. The brake works smooth until the speed gets down to 3 or 4 miles an hour, then it starts to catch and makes a sound like drawing a stick over the teeth of a cog wheel, but when the speed gets down to about 1 mile an hour, it suddenly locks the wheel. The brake holds well going down hill. Would tightening or loosening the brake band help any?

2—The car is equipped with a Holley carbureter. The engine idles smooth at slow speeds, but when I open the throttle, the engine quits firing and stops. Adjusting the needle valve does no good. What is the cause of this, and what can I do to help it?—C. C. M.

1—This is clearly a case of glazed brake bands, which will hold only with extreme pressure on the pedal and then they will slide the wheels. With normal pressure chattering results. The remedy for this is to reline the brakes, although a little kerosene on the bands might help.

2—This is not an unusual condition and in nearly every case may be remedied by getting a new needle and grinding it in its seat.

### SUBMITS OIL TEST SPECIFICATIONS Graphite and Oil for Gears Should Prove Satisfactory—Wants Vacuum Tank

Washington, Ia.—Editor Motor Age—Is the following a good test for cylinder oil? Flash 410 degrees, fire 465 degrees, gravity 30½, viscosity 215, cold 25 degrees.

2—Will this oil be all right for 1913 model 4-45 Apperson motor?

3—Would steam cylinder oil and graphite



be all right for transmission and differential lubrication, if so how much graphite to the quart of oil?

4—What advantage would there be by installing the Stewart vacuum feed system on this car? It has a Rayfield carburetor gravity feed tank under front seat?—Frank R. Mayer.

1—The data you give indicates a fairly good oil. Apparently it is from Pennsylvania crude.

2—Yes.

3—The combination would show good results. You can use half and half for summer and two-thirds oil to one-third graphite in winter.

4—You would gain little in installing a vacuum feed on a car fitted with seat tank, except that you would be able to climb a steeper grade without affecting the fuel flow when the vacuum system was installed.

#### CHARGING FROM THE MAGNETO Ford Instrument Could Not Properly Handle Battery Under All Conditions

Louisville, Miss.—Editor Motor Age—Assuming that the ignition on a Ford engine has been taken care of by a high-tension magneto, would the regular Ford magneto used in connection with a transformer and storage battery for lighting the car prove practical? That is, would the Ford magneto keep the storage battery charged under normal use?

2—Would it not be possible to change the Ford magneto into a direct current instrument by using different windings in the coils, and thereby eliminating the transformer altogether? If so, how should the coils be wound and connections made, or where could they be purchased?

3—What sized battery and lights would be advisable for two headlights, one dash and one taillight?

4—Please explain the action or winding of a transformer. If one was purchased to use with a Ford magneto, could it also be used to charge the battery from a 110-volt alternating current source?

5—In installing a high-tension magneto on a Ford engine, is it not best to use gears instead of the chain?—Hiram Davis.

1—The Ford magneto has been used successfully in this way for ordinary use, but Motor Age is of the opinion that under certain conditions the battery would be severely undercharged with the result the accumulator would be ruined.

2—To change the Ford instrument to a direct current one would entail some expense in installing a commutator. The reconstruction is not advised.

3—A 6-volt, 60 or 80-ampere-hour battery will prove satisfactory.

4—You evidently refer to a rectifier. This could not be used in a 110-volt circuit if designed for 12-volt service.

5—Silent chain drive will give good service, although the gear installation will be neater.

#### HILL CLIMBING AND SPEED ABILITY Comparing the Four, Six and Eight As to These Qualities

Corning, Cal.—Editor Motor Age—Taking a four, six, and eight-cylinder car with the same gearing and of equal weight and horsepower, which one would take hills easiest?

2—Which one would produce more speed?

3—Is the eight-cylinder car a logical car?

4—Why is it that six-cylinder cars are not raced in the United States?

5—Kindly explain why European cars of low rated horsepower can develop so much in excess of their rating? Why cannot American cars do this?—D. K. Kempton.

1—As to the hill-climbing ability of three cars of equal gearing, weight and horsepower,

one a four, one a six, and one an eight-cylinder engine, the eight-cylinder should prove the better hill climber, providing sufficient radiating surface were supplied. The six is a better hill climber than the four. This is on account of the more even impulses obtained by the greater number of cylinders.

2—So far as speed tests have gone up to date, the four-cylinder car seems to be better in speed, probably with the eight second, although the eight has not been raced enough to make this statement positive.

3—There is nothing illogical about the eight-cylinder car.

4—The reason European cars of small bore have developed power so much in excess of their rating is on account of exceptional and careful design and construction in the matter of cylinder shape, compression, valve and port areas, well designed intake manifolds, light reciprocating parts, high pressure oiling, and above all, accurate balance.

5—American cars are progressing towards this ideal very rapidly.

#### VARIED QUESTIONS ABOUT CARS Horsepower of Reo Four and Six—Can Drive with Broken Spring

Waumandee, Wis.—Editor Motor Age—Can 35 by 4 tires be used on the detachable rims used on a 1912 Reo? Tires now used are 34 by 3½.

2—If either of the springs should be broken on the Reo, would not the torque rod in the center hold the axle in place and allow the trip to be run with the car.

3—What type of piston ring is used on the 1915 Reo.

4—How could an attachment be put on to operate the cutout from the driver's seat on the 1915 Reo, as they provide no means to operate same from the seat?

5—Does the Paige company make all its parts?

6—What type of motor does the Reo use in their six? What is the brake horsepower of same, also of the Reo four-cylinder?

7—Is the gear ratio the same on the 1915 Saxon roadster as on the 1914?

8—Could not a motor with about 20 horsepower be used in the Saxon roadster?

9—What make of starting and lighting system was used on the 1913 Imperial?—R. G. Everest.

1—Yes.

2—You could continue slowly with the broken spring.

3—The 1915 Reo uses a three-part iron ring.

4—This is very simple, requiring only the attachment of a cable from the cutout to the pedal. The cutout is not connected because there are many cities which do not allow the accessory to be operated from the seat.

5—The Paige company does not make all parts of its cars.

6—The Reo six uses a valve-in-the-head

motor with a brake horsepower of about 45. The four shows about 35 horsepower maximum.

7—Yes.

8—Yes.

9—The Northeast system is used.

#### CYLINDERS GET TOO MUCH OIL Rod Scoops May Be Too Long—Level Reduction Suggested

Good Hope, Ill.—Editor Motor Age—I have an Overland, Model 42, which gets too much oil in the combustion chamber. I have fitted new piston rings, but it does not seem to do much good. It has good compression, but always did get too much oil even when new. Would it not be advisable to cut off the ends of the projection that splash up the oil on the ends of connecting rods? If so, how much should I cut off?

2—I am installing a Stewart vacuum feed on this car. Should the carburetor be higher? If so, how much?—A Subscriber.

1—It is possible that the scoops are a little long, but before making the scoops smaller Motor Age suggests you try keeping the oil level low. The level should be reduced a little at a time until the smoking stops. If you decide to remove metal from the scoops, you should use a file and try to remove the same amount from each rod. Motor Age cannot tell how much it will be necessary to remove.

2—You will not have to change the position of the carburetor to install the Stewart vacuum feed system. The system will operate as long as the Stewart tank is above the carburetor, giving sufficient head to cause gravity fuel flow.

#### FORD CAR HAS A PISTON SLAP Probable Condition Which Causes Disagreeable Noise

Hamburg, Ill.—Editor Motor Age—My 1912 model Ford has a loud knock in the motor which sounds like a loose connecting rod bearing, but it cannot be that, as the motor has been overhauled two different times and all the main and connecting rod bearings are tight. The knock has been there some time and does not seem to have any effect on the power of the motor, it knocks running idle or pulling. The knock is worse on an advanced spark, and by taking the spark plug cable off of cylinder No. 2 the knock can hardly be heard. What would Motor Age suggest as the reason for this knocking?—A. F. Buchanan.

The knock apparently is caused by a loose piston in No. 2 cylinder. The sound you hear is known as a piston slap. Motor Age suggests you take the car to the nearest Ford service station and have a thorough examination made before the motor is dismantled.

#### Horsepower Rating of Two Motors

Stronghurst, Ill.—Editor Motor Age—Kindly give the standard rating and rate of the Haynes light six and the Mitchell light six 1915 models. —Ed Stine.

The Haynes light six is rated at 29.45 horsepower by the S. A. E. formula. The Mitchell is rated at 38.40 by the same formula.

#### Testing Motor Oils

Hebron, Ill.—Editor Motor Age—Can Motor Age furnish any data relative to testing lubricating oils, fire test and viscosity? The tests are to be made by a local druggist.

2—What tests would constitute good oil?—J. S. Losee.

1 and 2—You are referred to the article on testing oils and fuels in this issue of Motor Age.

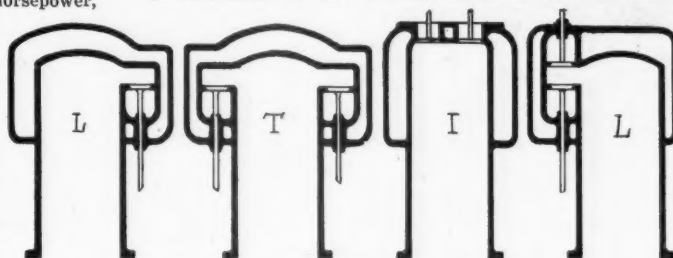


FIG. 6—EXAMPLES OF DIFFERENT MOTOR TYPES

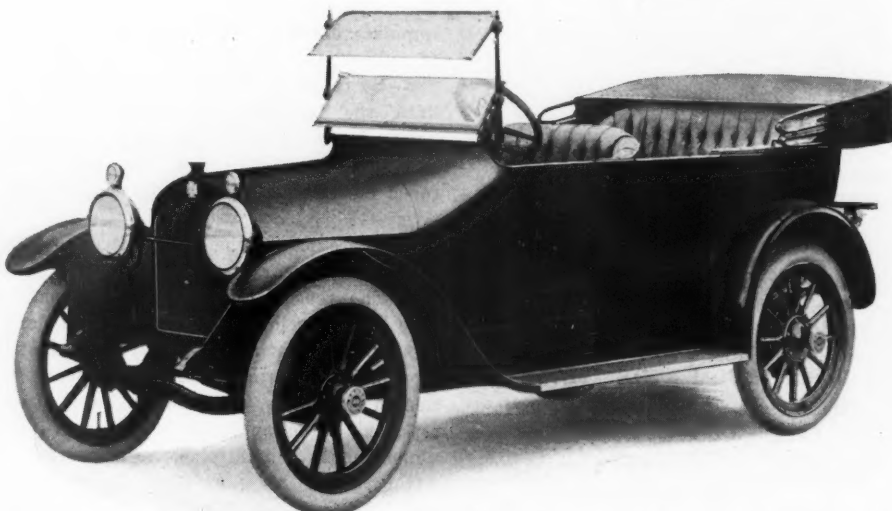
# Empire 33 a 1916 Model Much Improved Over Former One

## Wheelbase Lengthened, Motor Sizes Changed, Body Made Larger

A 1916 model, one of the first to be announced, has been brought out by the Empire Automobile Co., Indianapolis, Ind., the latest car from the Hoosier capital being called the model 33 and listing at \$975, the same as the car which it supercedes, the 31-40. With the same price, the new car is fundamentally the same in design, but with so many changes in the size of the various parts and in the shifting around of units, that it is best called a new instead of a redesigned model.

Exteriorally, the untrained eye can detect little difference between this new-comer and the 1915 Empire, yet a measuring tape and close scrutiny will reveal a 112-inch wheelbase instead of 108, a much larger tonneau, heavier springs in front and rear, a larger four-cylinder motor with dimension  $3\frac{3}{4}$  by  $4\frac{1}{2}$  instead of  $3\frac{3}{4}$  by  $4\frac{1}{2}$ , and a floating rear axle instead of a semi-floating. At a glance, one can see that left drive and center control is used instead of right drive and center control as was employed on the 1915 model, new headlights with smaller lights integral with and above them, the horn button has been shifted from the side of the seat to the center of the steering post, a Schebler carbureter now is used instead of that employed previously and a one-man top supplants the ordinary type. Then there are other changes such as the use of Stanweld demountable rims in place of the type used the last year, an improved Remy cranking, lighting and ignition system and a Fedders round top radiator in place of the one used before.

Accessibility has been carried farther than the motor, clutch and gearset. The rear wheel service brakes can be adjusted by turning a large wing nut. It merely means stooping over a little and giving this nut a turn or two. The cranking, lighting and ignition unit is well up in front with all parts within sight and easy reach. The valves can be removed or adjusted without very much trouble because pains have been taken to allow little to obstruct them. This is clearly shown in the photo-



*New Empire 33, which lists at \$975 and has a 112-inch wheelbase, 4 inches longer than that of the 31-40, which it supercedes*

graph herewith, illustrating the left side of the motor. It also will be seen that the Schebler carbureter is not so low as to make adjustment difficult.

In the power plant, which is suspended at three points, there is a four-cylinder motor, a running-in-oil disk clutch and a three-speed gearset. There is nothing unconventional in the design of any of these units.

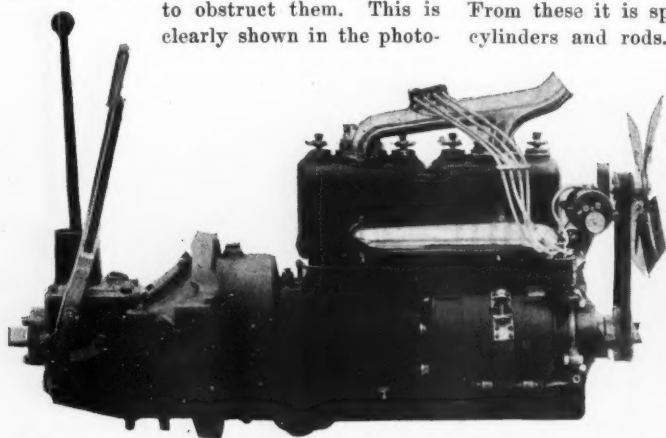
### Details of the Motor

Pair-cast, L-head cylinders are used with all the valves, which have a diameter of  $1\frac{1}{8}$  inch, on the left side, together with the new Schebler carbureter feeding through a simple two-arm manifold held in place by clamps. The valve springs have individual inclosures so as to keep out dirt. Each valve housing may be removed quickly by unscrewing one bolt. At the rear of the motor is a plunger oil pump driven from the camshaft. Oil is forced from the pump through a dash feed from which it flows through pipes to the main bearings, the overflow dropping to troughs under the connecting rods. From these it is splashed for feeding the cylinders and rods. The excess drops to

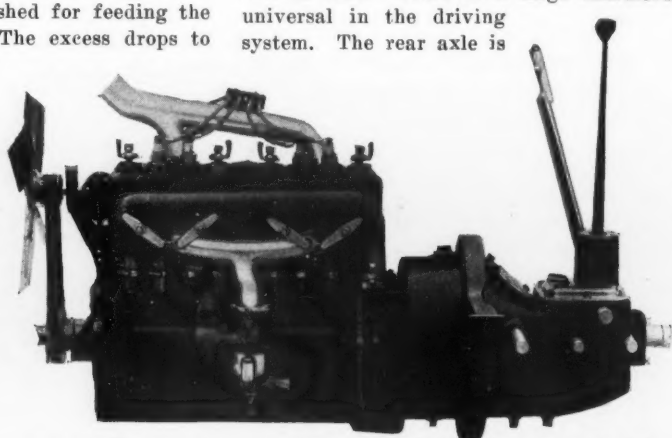
a sump from which it is again picked up by the pump and recirculated.

Cooling is by thermo-syphon with rather large inlet and outlet passages. Directly below the inlet on the right side of the motor, is the Remy cranking, lighting and ignition unit. This is a motor-generator with ignition distributor attached, the coil being mounted transversally and slightly above the distributor. The Remy unit is connected to the crankshaft by silent chain, the ratio being 3 to 1. It is operated by a push button on the dash. All lighting wires from the instrument are carried in metal tubing which is fastened to the frame. The battery used in connection with this system is a 12-volt, 50-ampere-hour long-type Willard.

The clutch is of the running-in-oil type using fabric-faced plates against a single-steel driving disk. The three-speed gearset affords the following ratios: First speed, 13 to 1; second, 8 to 1; high, 4 to 1 and reverse, 16 to 1. The drive from this unit is by a propeller shaft inclosed in a torsion tube. There is a large Hartford universal in the driving system. The rear axle is



*Right side of the 1916 Empire motor, showing the Remy starting, lighting and ignition installation*



*Left side of Empire 33 motor, showing individual enclosures for the valves and high position of carbureter*



a Weston-Mott floating, of new design fitted with two sets of brakes, one of which is adjusted by means of wing nuts as mentioned previously. The drive shafts are  $1\frac{1}{8}$ -inch diameter and operate on Hyatt bearings. The wheel bearings also are Hyatts.

The steering post, made by the Warner Gear Co., Muncie, Ind., now is on the left side operating the conventional mechanism to the front wheels. Wheels use 32 by  $3\frac{1}{2}$  tires, the rears being non-skids.

The body, while it has a roomier tonneau than that of the 1915 car, is little different in appearance being fitted with a cowl dash from which there is a slope

to the hood line. The headlights are entirely new, being really two lamps made integral, the regular lamps having above them smaller ones with their own reflectors and bulbs. The small lamps are used for city driving. It will be noted the radiator is rounded on top and is much better appearing than that used on the 1915 car.

In the equipment of the new Empire will be found a one-man type of top, with quick-acting curtains, 60-mile Stewart speedometer, tire carrier at the rear for two tires, one extra Stanweld demountable rim, Remy cranking, lighting and ignition system and the regular fittings such as tools, electric horn, etc.

open and close the bypass as needed. It is stated that good fuel economy results from this arrangement. Single ignition by Eisemann magneto is employed.

The chassis construction presents no unusual features of design, but appears to be substantially built along conservative and conventional lines. The drive from the three-speed gearset back to the jackshaft is through a shaft having two universals, one at either end. The jackshaft is the regular Timken design with a ratio of  $3\frac{3}{7}$  to 1, standard.

Then from the jackshaft, the power is sent to the rear wheels through roller chains. The springs attach to it substantially and run outside of the side members of the frame to their mountings. Timken bearings are used in axles and gearset.

The total gear ratio from motor to rear wheels is 9.39 to 1, standard, with other ratios optional, as stated above. The braking system employs one set of brakes on the jackshaft and the other on the rear wheels. Those on the jackshaft, the service set, have 12-inch drums, while the emergency brakes on the wheels act on 18-inch drums and expand internally.

The frame for the Hall truck is manufactured with all accessories, such as brackets, step hangers, and so on, in the concern's plant, from a special rolled steel. **Seat and Dash of Steel**

Seat and dash construction is worthy of comment, being made from steel and welded together to make a unit. This will remove any tendency for rattle. The gasoline tank goes under the seat and can hold 32 gallons. Steering gears are worm and sector in design, and the wheel, mounted horizontally on a vertical shaft, is on the left side, with control levers in the center.

The standard wheelbase of this  $3\frac{1}{2}$ -ton model is 144 inches, which gives a loading space of 145 inches without body overhang. Optional lengths of wheelbase from 10 to 18 feet are obtainable, and frames up to 24 feet are to be had to meet special haulage conditions. The standard tire equipment calls for single front tires and duals in the rear, both 36 by 5 size.

The standard chassis price is \$2,800, with driver's seat and dash. The option of electric starting and lighting equipment at \$150 additional, and of rear wheel and tire equipment of 40 by 5 size, dual, at \$50 extra, illustrate the provision made for taking care of any requirements. Rear springs of 5-ton capacity are also to be had for an additional \$10.

#### PURITAN BUYS SPEEDWELL PLANT

Dayton, O., April 10—The Speedwell Motor Car Co. has been purchased by the Puritan Machine Co. The business will be continued at the Puritan plant in Detroit and all the assets are now being moved to that city. All original patterns, drawings and engineering data were included in the purchase, so that the Puritan is in a position to duplicate any part.

## Hall Trucks Latest to the Field

### Chain Driven and Built of Standard Units

**L**ATEST to enter the truck field is the Lewis-Hall Iron Works, Detroit, which is an old-established plant not connected with the motor car business until the bringing out of this new truck. Doing a structural steel business, the founder of the concern, Henry B. Lewis, has been located here for more than 25 years. Last year he associated H. S. Hall with himself under the present organization, which was incorporated for \$175,000. Mr. Lewis is president and treasurer, while the active management is shouldered by Mr. Hall, the vice-president.

In addition to having a complete plant for making structural steel parts, the concern maintains a machine shop equipment, and is thus happily situated for truck manufacture. The frame is constructed by the company. W. K. Ackerman, formerly with the Standard Motor Truck Co., and previous to that connected with the General Motors commercial vehicle properties, is designer of the trucks.

#### Cars Are Assembled

The new Lewis-Hall product will be known as the Hall truck, and is strictly an assembly proposition, making use of Timken axles, Continental engines, Brown-Lipe gearsets, Gemmer steering gears, Mayo radiators, and so on. Though details of only the  $3\frac{1}{2}$ -ton model are given out at this time, the concern is planning to have a complete line of vehicles to meet all classes of service. Later, then, there probably will be a 2-ton model and

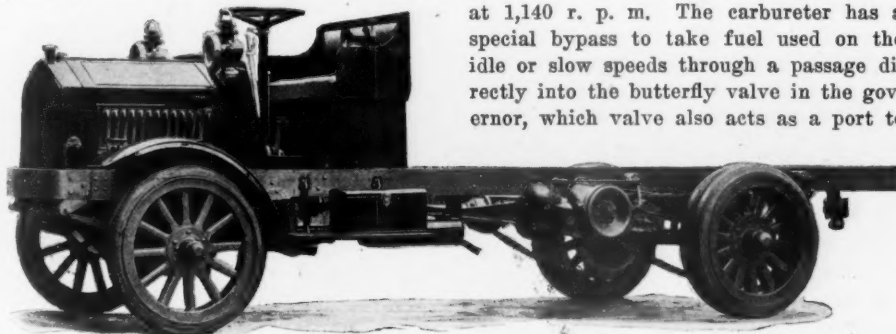
a 5-ton type. However, the model here described is typical of the Hall make, and will serve to indicate what the general design of the other models will be.

The Continental engine used is the  $4\frac{1}{2}$  by  $5\frac{1}{2}$  four-cylinder L-head, with the cylinders cast in pairs. The gearset is in unit, and the whole assembly is hung from a special auxiliary frame separate from the main frame. This is commendable construction for heavy duty service, as thus any twisting or weaving to which the main frame is subjected is not transmitted to the engine unit.

This motor has a factory rating of 45 horsepower, while the S. A. E. formula accords it 32.4 horsepower at 1,000 feet per minute. The lubrication system is of the combination force-feed and splash type, which should be of special advantage in truck service. The cooling is another important point to be considered for truck work, and it is taken care of by a centrifugal pump mounted on the engine base and driven at engine speed. The Mayo radiator is a cellular type and is carried on specially-designed spring buffers, so that road shocks and jarring will not hurt it under normal conditions. There are coil springs above and below the carrying point, enabling the mounting to take the rebound as well as the road shock.

#### Kramer Governor Used

The motor uses a Zenith carbureter, in connection with which a Kramer governor. It is set to get the maximum engine power at 1,140 r. p. m. The carbureter has a special bypass to take fuel used on the idle or slow speeds through a passage directly into the butterfly valve in the governor, which valve also acts as a port to



NEW  $3\frac{1}{2}$ -TON HALL COMMERCIAL VEHICLE

# Sternberg Announces New Series Worm-drive Trucks

## Sterling Models From 1-2 Ton to 5 Tons Capacity



VIEW OF NEW 2-TON STERLING TRUCK

A NEW series of Sterling worm-drive commercial vehicles of capacities ranging from  $\frac{1}{2}$  to 5 tons, is announced by the Sternberg Motor Truck Co., Milwaukee, Wis. At the present time only the 2 and 3-ton models are ready for shipment, the  $\frac{1}{2}$  and 5-ton models being in production and scheduled for the market at an early date. In general construction these vehicles are the same, differing only in the size of the various units. In the essentials, there is a unit power plant, consisting of a four-cylinder motor, disk clutch and three-speed gearset, the latter driving a tubular shaft to an over-type worm rear axle. The similarity in mechanical construction and outward appearance being so much the same in all models a description of the 2-ton will suffice for all.

### Optional Wheelbase

This model has a 148-inch wheelbase as standard and 184 as a special job with a rear wheel tread of 59 inches and upon the chassis is a  $3\frac{3}{4}$  by  $5\frac{1}{4}$  motor with pair-cast, L-head cylinders. Oiling is by a combination force feed and splash and cooling by centrifugal pump. An Eisemann magnet with automatic advance furnishes the ignition current and a Holley instrument feeds the fuel. An automatic centrifugal governor controls the motor speed.

The clutch, which is a dry-disk, is accessibly located as in the gearset, the units being directly under the floorboards of the driver's cab. The gearset affords the following speeds: On direct the maximum speed is  $14\frac{1}{2}$  miles per hour, on second, 8.2 miles per hour and first 4.3 miles per hour. These speeds will vary with the different models.

The drive shaft is a 2-inch tubular fitted with two universals and operates a Sheldon,

by circular cuttings.

The wheels are 36-inch all around. On the 2-ton they are equipped with 36 by 4-inch front and 36 by 4-inch dual rear or 36 by 7-inch single rear tires; on the 3-ton with 36 by 4 inch front and 36 by 5-inch dual rear tires.

The steering is of the Ross irreversible worm and nut type, the steering position being at the left with center control levers. The braking system on both trucks is of the internal expanding and external contracting type, both sets of brakes being in the rear wheel hubs.

### Equipment Furnished

Standard equipment consists of side and tail oil lamps, horn, complete set of tools and jack, hub mileage recorder, leather upholstered cab with removable aluminum footboards. On both trucks three sets of gear ratios are optional. The standard gear ratio on both models are 7.7 to 1. Optional gear ratios are 8.6 to 1 and 6.5 to 1. A combination Westinghouse starting and lighting system, operated from the transmission, is provided on the 2 or 3-ton models at an extra cost of approximately \$200.

The 2-ton model is listed at \$2,800 and the 3-ton at \$3,400, and at ad-

ditional cost special body types are fitted to meet the requirements of the purchaser.

semi-floating, over-type axle with ball thrust bearings. The worm is of the straight type and lubricating of it is assisted by ducts cut in the differential quadrant support. Propulsion is through the springs only.

The frame construction is that which the concern has used for the past 8 years and is of the laminated or wood in-laid type. The frame cross members are made light by the removal of metal

ditional cost special body types are fitted to meet the requirements of the purchaser.

### ASSAULT WITH CAR POSSIBLE

Jersey City, N. J., April 10—According to an opinion handed down recently in this city by the New Jersey supreme court, a motorist who runs down a person may be indicted for assault and battery. The decision sustains the conviction of Walter Schutte, this city, who was indicted for assault and battery for running into and injuring Thomas Mitchell while driving his car at excessive speed. Justice Garrison, who wrote the opinion, said:

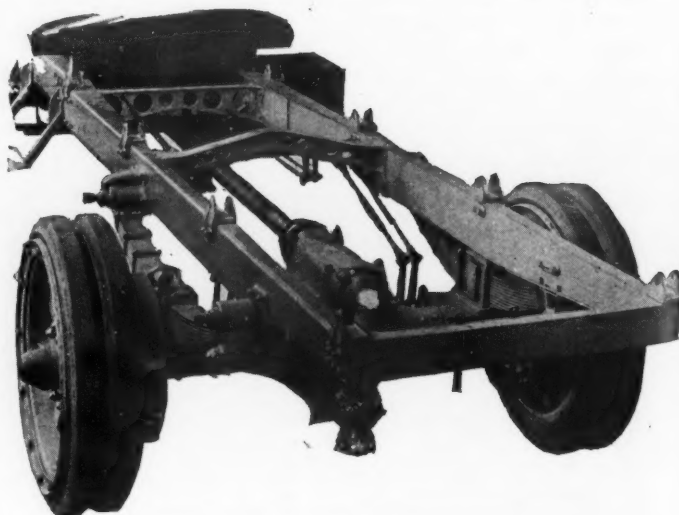
"A criminal assault may be committed with motor car driving along a public street at an excessive rate of speed that endangers the safety of other persons and actually results in such an injury. It requires neither argument nor illustration to show that the excessive rate of speed at which a car is driven is a product of the will of its driver and not the result of his mere inattention or negligence. The two cannot be confused any more than the hurling of a baseball bat into a crowd of spectators could be confused with its accidentally slipping from the hand of the batter.

"It has been held that responsibility increases with the likelihood of injury, but never the reverse that I am aware of."

### LEGISLATION IN TEXAS

Austin, Texas April 10—Several of the Texas towns have under consideration ordinances regulating the jitney transportation service. In Fort Worth and Houston ordinances that are alleged to be particularly drastic have been adopted. The constitutionality of the Fort Worth ordinance is to be tested in the courts.

The case that is expected to determine



CHASSIS VIEW OF THE STERLING TRUCK



to a more or less degree the standing of the jitney car as a vehicle of transportation is that of ex parte I. W. Sullivan. Under the Fort Worth ordinance Sullivan was fined \$10 annual tax for the privilege of operating a jitney car upon the streets of that city. He has taken an appeal to the state court of criminal appeals and the case was formally submitted to that tribunal on March 31. It is expected a decision will be handed down in a short time.

The attorneys for Mr. Sullivan allege on his behalf that the ordinance is unconstitutional because it is class legislation, inasmuch as it fixes a tax on operators of jitneys in excess of that levied on hacks and buses, which is \$3 per annum.

The Houston jitney ordinance requires

a bond of \$5,000, with one-half that sum as the maximum amount of recovery in case of injury. Jitneys are forbidden to pass street cars, while the latter are taking on or discharging passengers. The ordinance also provides a license fee for each jitney and contains several other drastic provisions which are objected to by the operators of the cars. The measure will be tested in the courts, it is announced.

The two principal objectionable features of the Dallas jitney ordinance from the standpoint of the operators are those which requires them each to give a bond of \$2,500 as a protection to passengers in case of injury and the one that prohibits them from carrying passengers on the running board of their cars when the compartments are filled.

the propeller shaft is uninclosed and has a universal at either end.

The chassis buyers are offered options of ignition—either Atwater-Kent distributor system or a magneto. Also it can be furnished either with or without an electric starting and lighting equipment. However, the make of this apparatus is not mentioned at this time. The wheel equipment is another point where the assembler is given an option. Wood wheels either 28 by 3, 30 by 3 or 30 by 3½, with or without demountable rims, are obtainable.

The chassis, as it comes to the car assembler, is also fitted with a cellular radiator, has the gasoline tank suspended at the rear of the frame, and running board brackets, lamp brackets, etc., are in place. It is stated that in addition to the chassis above mentioned,

#### CADILLAC FILES APPEAL

Cincinnati, O., April 12—The Cadillac Motor Car Co. has filed an appeal in the United States court at Cincinnati in the case of Walter S. Austin against the Cadillac company and John M. Van Loon, for alleged infringement of patent in a "change speed gearing." The court held that the patent rights of Austin were valid and infringed, granting an injunction and ordering an accounting. The Cadillac company will seek a reversal.

## Pontiac Concern Sells Chassis Only

### Customer Mounts Own Body and Fittings

A NEW wrinkle in the motor car industry in America is the plan of the Pontiac Chassis Co., Pontiac, Mich., a new concern whose incorporation was announced last week, to build for the trade, chassis minus bodies and tires. The customer receives the chassis in this form, mounts his own design of body and top, puts on the tires, and then sells the completed car under his own name. The chassis is built for assemblers only, and it is stated that by this method, the small assembler is enabled to produce a car at as low a price as the large manufacturer.

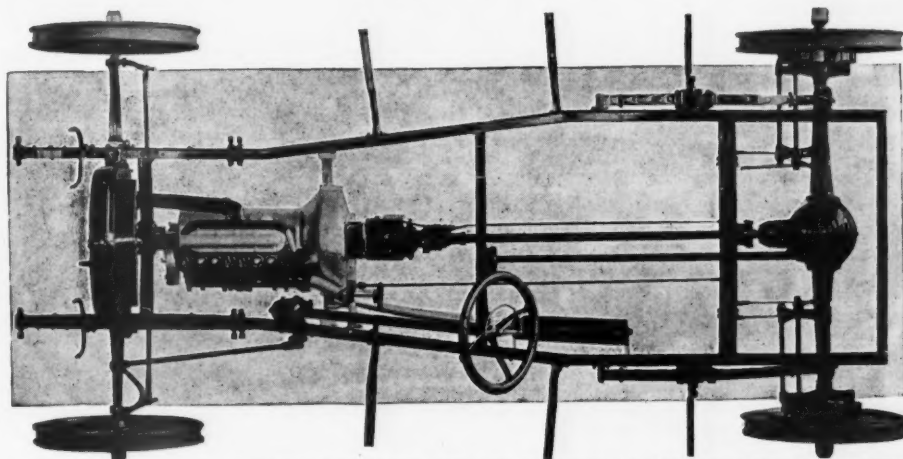
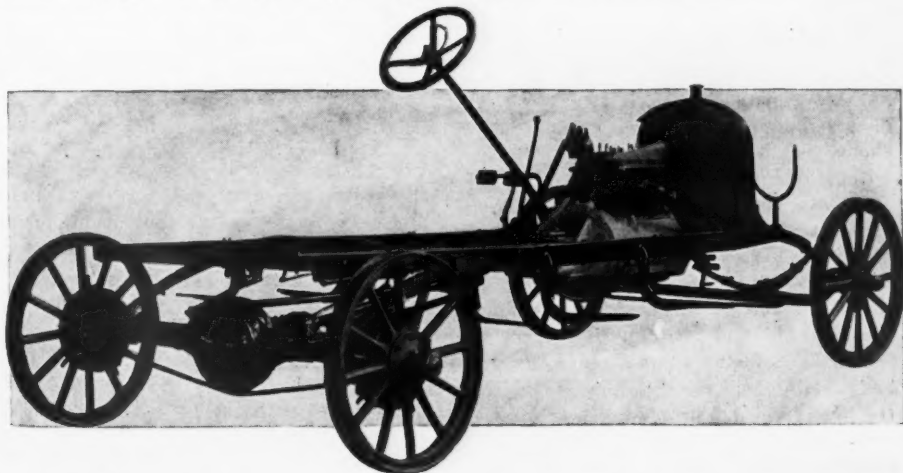
Incorporators of the new concern with this unique manufacturing plan are R. A. Palmer of Pontiac, formerly general manager of the Cartercar and Oakland companies; Robert Perkins, secretary of the Massnick-Phipps Co., maker of eight and four-cylinder motors in Detroit, and H. H. Brooks, former sales manager of the Marathon Motor Works, Nashville, Tenn., and later of the Herff-Brooks Corp., Indianapolis, Ind. The authorized capitalization is \$100,000, and it is said that other Detroit and Pontiac capital is interested in addition to that represented by the above-named principals.

#### Perkins Motor Used

The first design of chassis to be produced by the Pontiac concern, which is doing its assembling in the plant formerly occupied by the Flanders Mfg. Co., now out of business, is a 25-horsepower type using, the Perkins small four-cylinder engine which has a bore and stroke of 3¼ by 4½ inches. It is an L-head engine with cylinders in a block and three-speed gearset in unit.

There is nothing unusual about the chassis or its power plant, conventionally-accepted practice being adhered to in its construction. The specifications include a floating rear axle with annular ball bearings and roller bearings, this be-

ing a Salisbury unit. The wheelbase is 106 inches; pressed-steel frame construction is followed with a taper to the front; the front springs are semi-elliptic, while the rear set are of cantilever form, attaching at two points to the frame, shackling to the rear axle. The drive is by the Hotchkiss method and the drive is taken through the springs. Accordingly,



TWO VIEWS OF THE PONTIAC CHASSIS, WHICH IS SOLD AS SHOWN, THE PURCHASER MOUNTING THE BODY, TOP AND OTHER FITTINGS TO SUIT HIS REQUIREMENTS

# Some Tests of Lubricating Oils and Gasoline Outlined

## How to Determine the Grade of Motor Lubricants and Fuel

SO many requests have been made by readers of Motor Age for the methods by which a layman may test his cylinder oil and gasoline, that it is thought the directions given below may be of value. These directions are those given by the refiner of Veedol oils, but they are equally applicable to the testing of any grade of motor car cylinder oil. The real basic test, it may be said, is an actual mileage test, gallon for gallon, similar to that outlined in this article. Following are the directions for the complete series of tests as given by the Platt & Washburn Co.:

### Heat Test of Oil

The reaction known as the heat test is very simple to make with any lubricating oil. Simple though it is, perhaps there is no other test which indicates so decisively and so quickly the purity and degree of refining of an oil, as well as its durability, when such an oil is subjected to the extremely high temperatures met with in internal combustion engines.

The heat test consists of heating a sample of oil up to a temperature of between 300 degrees to 500 degrees Fahrenheit, depending upon the flash point, and holding same at this temperature for a period ranging from 10 to 15 minutes.

Two distinctive results are obtained:

1. A good durable oil shows a slight darkening from its original color, the change in color being only to a darker shade, the oil still remaining clear, and without sediment.

2. A poorly refined and impure oil shows an immediate alteration in color, quickly changing to a dense black. As the heat is maintained a black precipitate settles out. The quantity of this precipitation depends upon the impurity of the oil.

Just as different samples of oil, good or bad, retain their color, or blacken, during the heat test, just so will be their reaction when exposed to an even higher heat in an explosion motor, and it is reasonable to conclude that a continuous precipitation of black sediment in impure oil will rapidly destroy its lubricating properties, and within a short time be the cause of costly wear of all parts in moving contact.

### Emulsion Test

The emulsion test shows the quality of lubricating oils about as accurately as does the heat test on straight or blended, hydrocarbon oils only; wherever animal or vegetable oils are present, this test ceases to be reliable.

The emulsion test consists of vigorously shaking a sample of oil with about an equal volume of water, in, say, a 4-ounce bottle, and allowing same to stand for 24 hours after shaking.

Results obtained are:

1. A good durable oil shows a very

slight white line of demarcation where the oil meets the water below it. The water upon which the oil floats may be nearly clear or slightly cloudy in appearance, thus showing the absence of acid compounds.

2. A poorly refined oil will be seen to have emulsified or permanently mixed with the water, and to have formed a semi-fluid, reddish-white or brownish-white mass, containing a slight layer or globules of oil. This curdled mass extends nearly to the bottom of the bottle and floats upon the remainder of the water, which is a milky white. Emulsification shows the presence of acid products.

Let all oil be drained from the motor to be tested, and the grade of oil recommended by the lubrication charts filled in, the exact weight in pounds of oil put into the motor being carefully recorded. The amount of fuel should also be ascertained, and a reading of the speedometer taken.

### Practical Road Test of Two Oils

Then let a test be run over an average road, including steep hills, straight, level stretches, etc., for a distance of some 50 or even 500 miles, if desired. At the end of the run all oil should be drained from the motor and weighed the amount of gasoline noted, and the total distance covered. The number of miles per gallon of fuel and oil can then be found, by dividing the total mileage run by the quality of fuel or oil in gallons.

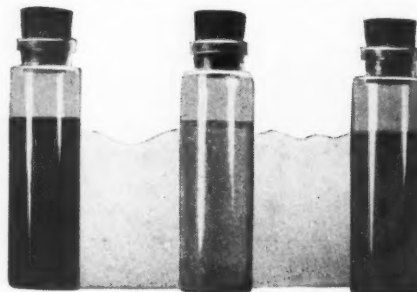
Next, let a similar test be run for the same distance, over the same road, and under the same weather conditions, using any competitive oil of the same grade.

### Gravity

The Baumé hydrometer is in general use throughout the United States.

This instrument, carrying an arbitrary scale, when allowed to float freely in an oil or other liquid, sinks to a depth corresponding to the density of the liquid. The Baumé gravity value is then read at the point where the surface of the liquid intersects the scale. The liquid is maintained at a constant temperature of 60 degrees Fahrenheit.

Specific gravity is the ratio of the



OIL BEFORE AND AFTER HEAT TEST  
In center is sample before test; at left, a poor oil after test, and, at right, a good oil after test

weight of a solid or liquid substance to that of an equal volume of water.

Gravity is of secondary importance in judging the qualities of lubricating oils.

### Flash Test

The flash point of an oil is the lowest temperature at which the vapors arising therefrom ignite, without setting fire to the oil itself, when a small test flame is quickly approached near its surface in a test cup and quickly removed. When an oil is used for the lubrication of internal combustion engines and thus exposed to severe heat, it becomes imperative not to allow the flash point to drop much below 400 degrees Fahrenheit. This is a guarantee of efficiency and durability. Flash is indicative of an oil's suitability for such use.

### Fire Test

The fire point of an oil is the lowest temperature at which the oil itself ignites from its vapors when a small test flame is quickly approached near its surface and quickly removed.

Since the fire is always above the flash, the fire value becomes of minor importance when judging oils for use in explosion motors.

### Viscosity

The viscosity of an oil is usually given in terms of time—the number of seconds required for a definite volume of oil to flow through a standardized aperture at constant temperatures. Viscosity is an empirical expression of the molecular cohesion, internal friction, of fluids. Viscosity values are commonly given at 70 degrees, 100 degrees and 212 degrees Fahrenheit. Example: gasoline is highly non-viscous, whereas molasses is highly viscous. In all lubrication the matter of correct viscosity is one of prime importance.

### Carbon Residue

Carbon residue determination consists of distilling a definite quantity of oil, in a standard flask, to the end, when a carbon deposit, or residue, is left upon the walls of the flask. This is weighed, and the percentage of carbon residue obtained. The percentage of carbon residue relatively high or low, which an oil contains does not necessarily indicate the amount of carbon deposit which will occur in the combustion chambers of a motor. Carbonization is also materially influenced by the quality of the oil, by its viscosity and flash, and by the mechanical defects in the motor.

### Color

Color values of oils are determined by comparing their colors, by transmitted light, with the colors of standardized chromate solutions, or with the colors of glass slides corresponding to these solutions. Color values are given for oil containers of different lengths, fitted with



clear glass ends, depending upon the light or dark character of the oil. Thus "100-6 inch" means that the oil sample has a value of 100 when viewed through a six-inch container or cell.

Color in no way indicates the quality, or the durability of an oil, neither does it show its suitability for any certain use.

#### Cold Test

The chill or cold test of an oil is the lowest temperature at which the oil will pour. This characteristic need only be taken into consideration because of its effect upon the free circulation of oil through exterior feed pipes, etc., where pressure is not applied. The cold test is in no way indicative of the lubricating or heat-resisting qualities of an oil.

#### What Happens to the Oil

Let us assume, for example, that a yellow oil is used without regard to the type of lubricating system. When the motor is run for a few hours the oil will have turned from yellow to bluish yellow, if not entirely blue by reflected light. If the motor be run for several days the oil will turn a darker blue, or black; if allowed to run several hundred miles, it will be found to have turned entirely black.

These changes in color indicate that the physical and chemical nature of lubricating oils, when used in internal combustion motors, undergo a progressive and destructive alteration.

## Testing the Quality of Gasoline as a Fuel

THE quality of a liquid fuel cannot be correctly described by the expression of its gravity alone.

It is customary in the trade to specify the gravity of a fuel as read on a Baumé hydrometer. The mere statement of the Baumé gravity of a gasoline or liquid hydrocarbon fuel is often not a true indication of its fuel value or ease of vaporization. The origin of the crude oil from which the fuel is made may also give rise to a material variation in its gravity without seriously affecting its easy evaporation.

As an example, let us make a mixture by pouring together equal parts by weight, of a gasoline of 80 degrees Baumé and of a kerosene of 40 degrees Baumé. The resultant mixture will have a Baumé gravity of 60 degrees which would be considered a fair gasoline, if judged only by its gravity. This mixture will not prove altogether satisfactory when used in an automobile engine, and it is apparent that some other comparative test is necessary when judging the true characteristics of a fuel.

A really practical test, which shows at once the volatility of liquid fuel, is the determination of the boiling point limits of the fuel. This test consists of observing—

- 1—The initial boiling point.
- 2—Per cent of volume distilling over at several intermediate temperatures.
- 3—The final boiling point.

It may be remarked that gasolines are not simple chemical compounds like water,

If a sample of the used oil is then drained from the motor and allowed to stand in a long narrow tube for 24 hours, a black deposit will settle in the bottom. Analysis of this sediment will show the presence of metal dust, carbonaceous matter, and carbon, all of which are detrimental to the life of the motor.

The metal dust, resulting from the wear of bearings and other moving surfaces in contact, permeates the entire body of the oil while the motor is in operation. Its presence in large quantities gives rise to rapid wear and loss of power. Although there is always some metal dust present in used oil, its quantity is diminished to a negligible minimum when oil of first class quality is used.

The carbonaceous matter appears black by reflected light, and brownish by transmitted light. It does not exert a noticeably destructive effect upon the mechanism of the motor, excepting in the case of inferior oils.

The carbon settles out as a black powder-like solid. It accumulates as a result of the deterioration of the oil exposed to high temperatures. When a considerable quantity of carbon is present, it has a very destructive effect upon the bearings—much like that of sharp emery dust. The wear is thus enormously increased and the operation of a motor soon becomes unsatisfactory.

but are physical mixtures of chemical compounds of carbon and hydrogen, each compound having different boiling points.

In general, the higher the initial and final boiling points the more difficult will be the starting of the motor on cold mornings. Much more heat will be needed for warming the mixing chamber of the carburetor, or the inlet air which passes through the carburetor. And, since preheating of carburetor or motor when starting is impractical, more or less difficulty will always be experienced with a cold motor when using a high boiling point fuel.

#### NEW SEVEN-PASSENGER CHANDLER

The Chandler Motor Car Co., Cleveland, O., announces a new seven-passenger model, selling at \$1,295, the same price as the for-

mer five-passenger, and having a 122-inch wheelbase instead of 120, a much larger body and Stewart vacuum fuel feed system in the equipment list. This new Chandler supercedes the former model. The auxiliary seats in the tonneau may be folded into the back of the front seat, so that when desired a five-passenger touring car may be had.

#### ARRANGE FOR TRUCK CONVENTION

New York, April 10—Progress in the plans for the motor truck get-together convention to be held in Detroit, May 5 and 6, indicates that not only will the industry be well represented, but that it will bring forth discussion of many matters of great pertinence. Arrangements have been made by M. L. Pulcher, of the Federal Motor Truck Co., William E. Metzger and Alfred Reeves, general manager of the N. A. C. C., to hold the convention in the banquet hall of the new Statler hotel and to have buffet lunches every day, so the delegates will have an opportunity to meet one another.

Three papers have so far been announced. The latest of these is to cover the subject of standardization load ratings to be presented by H. Kerr Thomas, a member of the commercial vehicle committee of the N. A. C. C. Other papers slated are:

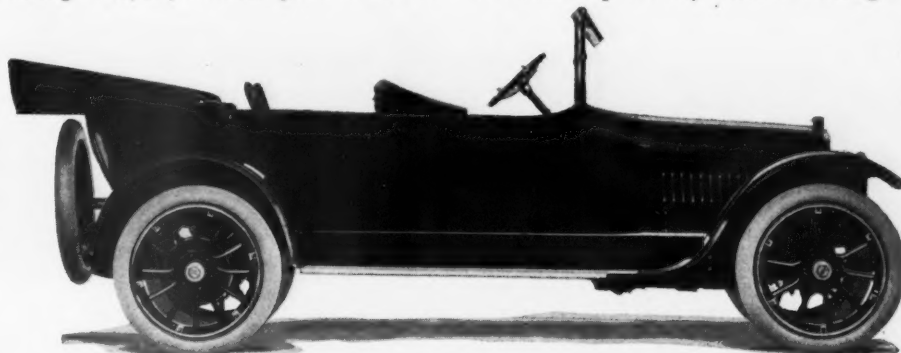
"Advantages of Selling on Time Payment Plans and How Truck Sales Should Be Made," by Windsor T. White, president the White Co., Cleveland.

"Can Manufacturers Have a Standard Service Problem?" by Alvan Macaulay, general manager Packard Motor Car Co.

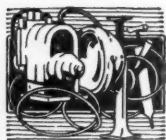
"Can a Standard Load Rating Be Devised and Approved by Manufacturers?" by H. Kerr Thomas, superintendent Pierce-Arrow Motor Car Co., Buffalo.

#### NEW BILLS IN ILLINOIS

Springfield, Ill., April 12—There have been several measures introduced in the legislature which have aroused motorists. House bill 445 proposes to limit chauffeurs to a 10-hour day. House bill 486 would charge 15 cents per horsepower on passenger cars and charge motor trucks at the rate of 25 cents per 100 pounds. House bill 282 would almost double the present fees. Bill 78 would compel drivers to come to a dead stop at every railroad crossing.



NEW SEVEN-PASSENGER CHANDLER WHICH LISTS AT \$1,295



# The Accessory Corner

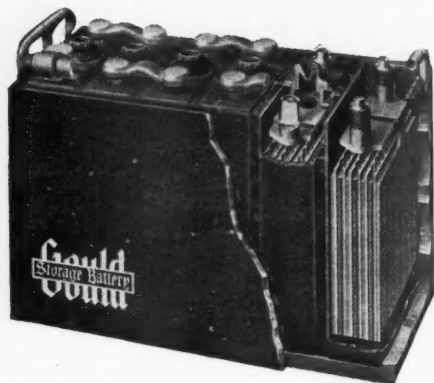
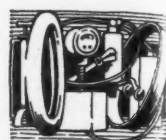


FIG. 1—NEW GOULD STORAGE BATTERY

## H-W Convertible Top

A ONE-MAN convertible top which is fitted with plate glass windows instead of the ordinary curtains, so transforming the car into one of the inclosed type, is announced by the Hammond-Williams Convertible Top Co., Inc., 241 W. 56th street, New York. This design differs from the type ordinarily called limousine tops, in that it can be folded out of the way by using the same method employed with ordinary one-man tops. When erected for use the glass windows give protection against the wind, etc., and there is no flapping or loosening of the parts. The time taken to raise it and place the windows in position is about 3 minutes, it is stated and when not in use the windows are carried in a narrow box behind the front seat. The general appearance of the H-W is shown in Fig. 4 and it will be seen that without the windows it appears little different from an ordinary one-man top but with the protectors fitted there is semblance to a limousine top installation. The change from open car to closed is accomplished through the use of the detachable glass panels which are secured in light channel frames which are attached to the top of the door and body sections by set screws. The transformation from closed to open car simply requires removal of the panels by loosening the set screws, placing the panels in the box provided and pushing the top back as one would the regular type. The weight of the whole installation is said to be 20 pounds and prices range from \$150 to \$300 depending upon the size and make of the car.

## New Gould Battery

The Gould Storage Battery Co., New York, has announced an improved type of lead storage battery for starting, lighting and ignition service which retains the features used in former Gould batteries but has a few refinements. One of these is the new cover arrangement which prevents electrolyte leakage and allows of the battery interior being inspected easily. Each cell is virtually closed by three

hard rubber covers and labyrinth passages and a baffle splash plate, as shown in Fig. 1. Where the pillar posts come through the cover, sleeves of corrugated rubber and surrounded with the sealing compound, make air and leak-tight joints of sufficient flexibility to allow for strains on the posts. These posts are colored differently to

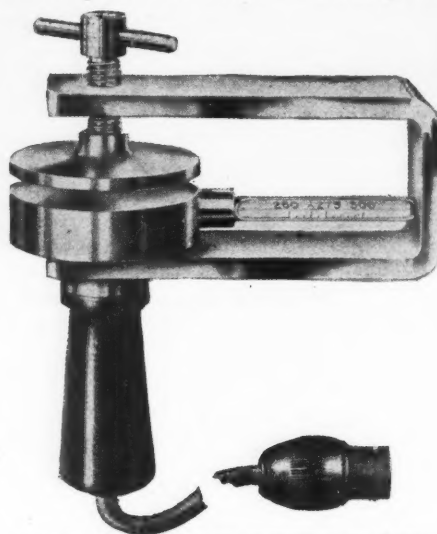


FIG. 2—CORBETT & DE COURSEY ELECTRIC VULCANIZER

enable the user to easily distinguish between positive and negative terminals.

A large expansion chamber with a threaded cap is provided for inspection and equalization of acid. Leakage up around the outside of this chamber is prevented by use of a rubber washer. Sopping over from the inside is prevented by making the cap an inverted cone. The spray condenses, drains to the point of the cone and drops back into the acid space.

Removal of the vent cap, by twisting between fingers and thumb, exposes the



FIG. 3—NEVILLE WHEEL FOR FORDS

entire chamber and admits enough light to make inspection possible. With this construction and the acid level carried up in the chamber, gassing may easily be detected. A straight channel to the electrolyte allows the easy insertion of a hydrometer syringe. The

vent cap also provides a natural funnel for filling in water or acid without slopping.

## New York Kick Switch

The New York Coil Co., 338 Pearl street, New York, has just announced a new kick switch fitted with a Yale lock, for attachment to Ford cars. When the key of the lock is turned the switch may be locked in either the off or the on position. This switch is designed in such a manner that the three holes for attaching to the Ford metal coil box register. It is necessary to remove the present switch and by means of the three bolts, secure the switch in position and connect the three wires to the connections marked 1, 2, 3, which may be accomplished in a few minutes without the splicing of any of the wires it is stated. The price is \$2.50.

New Vulcanizer  
A simple elec-

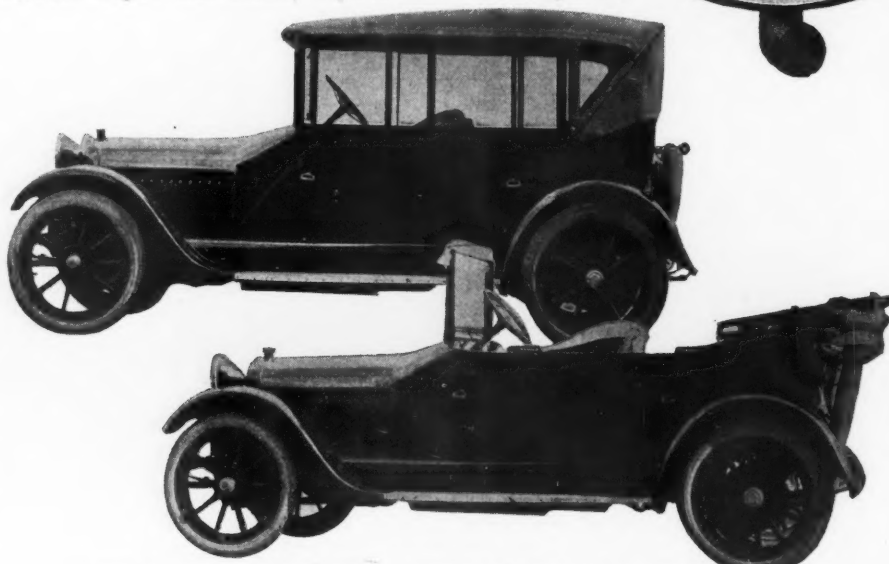


FIG. 4—CONVERTIBLE TOP IN OPEN AND CLOSED POSITION. UPPER, NEW KICK SWITCH FOR FORD CARS





FIG. 5—FENDER TYPE KAMLEE TRUNK



FIG. 6—ENTERPRISE TENT COT IN USE



FIG. 7—RUNNING-BOARD TYPE KAMLEE TRUNK

tric vulcanizer which is said to be very effective in making tube repairs on the road is that manufactured by the Corbett & DeCoursey Co., Columbia Bank building, Pittsburg, Pa. This vulcanizer uses the current from a 6-volt storage battery and is fitted with a temperature control and thermometer, so that the heat will be kept at about 275 degrees F. The inner tube is slipped between the two plates, shown in Fig. 2, and the handle turned to hold the tube firmly in position. Price is \$5.

#### Neville More-Room Steering Wheel

A new, Ford type, movable steering wheel now is being made by the Neville More-Room Steering Wheel Co., Detroit, Mich. With this wheel installed the driver may leave and enter the car more easily than when the ordinary wheel is used. The Neville can be shifted out of the way as shown in Fig. 3. This wheel can be attached in 15 minutes, is adjustable and allows 8 inches more room for entering and leaving the driver's seat. It is 17 inches in diameter, 2 inches larger than the regular Ford steering wheel and is fitted with a corrugated rim to insure a better grip. It is 1 inch closer to the windshield when raised than when in driving position. Price is \$6.

#### Beartone Price Reduced

The Oakes company, Indianapolis, Ind., maker of the Beartone combination cooling fan and horn, has announced a reduction in the price of this accessory from \$7 to \$5. The Beartone is one of the newer types of warning signals, being in the form of a horn unit incorporated with the fan of the motor. The signal is mechanically operated from the dash of the car.

## Interesting Accessories for Motor Car Tourists

EVERY motor car owner is anxious to keep an accurate record of the cost of car operation but rarely is this done if an ordinary note book is used, for the reason the various items are jotted down in any order, with the result that when totals are desired for various divisions it means a great deal of work. A motorist cannot attempt to reduce the cost of operation without first knowing how much is spent for each item. To make the car expense account record easily kept Motor Age offers a ruled book, with 45 pages, 7½ by 10 inches, and containing space for recording the cost of everything used during any period. The greater part of the book is taken up with pages ruled as shown in Fig. 8, where provision is made for jotting down odometer readings, fuel consumed, oil used, repairs, etc., for any trip on any day of the month. A vertical column shows the days of month and at the top of each page is a blank line for the insertion of the month.

In the back of the book, space is reserved for yearly summaries and after filling in certain spaces the cost per mile can easily be found. There is also a special tire record by means of which the owner can keep track of the service given by each casing. The price is \$1.50.

#### Enterprise Tent Cot

Motor tourists will be interested in an accessory called the Enterprise Tent Cot which is a folding sleeping cot covered

with a small tent as shown in Fig. 6. This outfit is made by the Enterprise Bed Co., Hammond, Ind., and when in position for use has an inside length of 6 feet 6 inches and a width of 28 inches. When folded it is 3 feet 6 inches long. The cot is 18 inches above the ground and the top of the tent 32 inches above the bed. The cot portion is made of 10-ounce brown duck and tent of 8-ounce duck. The weight is 29½ pounds and the price is \$9.50.

#### New Kamlee Trunks

Two new types of touring trunks have been brought out by the Kamlee Co., Milwaukee, Wis., one of these being of the running board type and the other for fender mounting. These trunks are made in many styles to suit the requirements of the cars upon which they are to be mounted, because the concern has found that individual installations are preferred to one standard type.

Like other Kamlee trunks these new models contain two or three suit cases, any of which may be removed without disturbing the others. The body is composed of several layers of laminated bass wood and covered with enameled duck. The binding and corners are reinforced with leather and the edges are fitted with a special rubber-lined interlocking, steel edge which makes the trunks waterproof and dustproof, it is claimed. All the locks, clasps, etc., are solid brass nickel plated finish.

| Month of _____ 191_____ |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
|-------------------------|-----------------|-------------------|----------------|-------|------|-----------|------|-------------------|------|-----------------|------|----------------------|------|-------------|------|
| Date                    | ROUTE AND PARTY | ODOMETER READINGS | DAILY MILE-AGE | FUEL  |      | LUBRICANT |      | Garage & Chaffeur |      | GENERAL REPAIRS |      | TIRES & TIRE REPAIRS |      | ACCESSORIES |      |
|                         |                 |                   |                | Gals. | Cost | Quantity  | Cost |                   | Cost |                 | Cost |                      | Cost |             | Cost |
| 1                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 2                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 3                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 4                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
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| 6                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 7                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 8                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 9                       |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |
| 10                      |                 |                   |                |       |      |           |      |                   |      |                 |      |                      |      |             |      |

FIG. 8—REPRODUCTION OF A PAGE FROM THE MOTOR CAR EXPENSE RECORD OFFERED BY MOTOR AGE



# Among the Makers and Dealers



**CAPITAL Stock is \$200,000**—The capital stock of the recently reorganized Hans Motor Equipment Co., La Crosse, Wis., is \$200,000, not \$20,000, as announced in a recent issue of Motor Age.

**New Regal Advertising Manager**—Robert H. Crooker, during the past 2 years with the advertising department of the Burroughs Adding Machine Co., has been appointed advertising manager of the Regal Motor Car Co.

**Asks Dissolution of Benham Company**—The Union Trust Co., which has acted as temporary receiver for the bankrupt Benham Mfg. Co., which made the Benham motor cars, has filed a petition asking for the dissolution of that company, in the interest of the stockholders.

**Gives Employment to 13,291 Men**—At the end of February there were 13,291 men on the payrolls of the different plants operated by the Maxwell Motor Co. This shows an increase of 5,930 men as compared with February, 1914. In February of last year the office forces totaled 506, while this year the number is 936.

**Duplex Trucks for War Use**—The Duplex Motor Truck Co., Charlotte, Mich., has been given an order for 375 Duplex trucks by an American concern acting as purchasing agent for a foreign country. The trucks are to be shipped to London. The prospects for receiving a duplicate order are promising, as the trial trucks gave entire satisfaction.

**Republic Truck Breaks Record**—Last week there were 200 men on the payroll of the Republic Motor Truck Co., Alma, Mich., the largest number in the history of the company. This force will be increased to 250 or 300 by the end of May. Orders in March were 60 per cent over those received in April and more than triple the number received in March, 1914.

**Receiver for Cyclecar Motor Maker**—J. D. Easterly has been appointed a receiver for the Oakbrook Motor Mfg. Co., Reading, Pa. This company manufactures cyclecar motors. W. F. Young, the plaintiff is a stockholder of the company and a creditor to the extent of \$9,849. The action has been taken to preserve the assets for the benefit of the creditors.

**Working Plant at Full Capacity**—The A. O. Smith Co., Milwaukee, Wis., pressed steel frames and parts, is again operating its big plant at full capacity, the number of employees on March 27 having reached more than 1,200. According to C. S. Smith, vice-president, business is brisk and the company's customers are making larger purchases than for a long time. Mr. Smith anticipates a maintenance of this demand throughout the summer and fall.

**More Case Cars for Czar**—A trainload of Case motor cars, consigned to Vladivostok, arrived in Seattle recently, the same being part of a large order placed with the Case company by the Russian government. This trainload is the second consignment which has come through the port of Seattle bound for Siberia during the past month. Considerable secrecy surrounds this shipment, but it is estimated by the Case distributors in Seattle, Sharp & Leader, that it contains approximately 168 motor cars. On each of the twenty-one flat cars are two boxes containing the parts for probably eight machines each. The value of the shipment is about \$250,000. The machines were shipped from Seattle to Vladivostok on the Russian boat now making that port,

and will be re-shipped from there to eastern Russia. Upon their arrival in Petrograd, they will be uncrated and assembled by a skilled crew of Case factory expert mechanics.

**New Buildings for Savage Tire Co.**—The Savage Tire Co. of California is constructing two important additions to its factory, made necessary by the large amount of business already on hand. A new office building will be erected and a structure that will provide additional manufacturing space.

**To Take Charge of Lozier Sales**—L. B. Berger, who was with the Willys-Overland Co., having charge of the sales of the Willys-Knight at the Garford plant in Elyria, O., has resigned to join the Lozier Motor Co., where he now has charge of the sales department.

**New Premier Purchasing Agent**—E. E. White has been appointed purchasing agent for the Premier Motor Mfg. Co. Mr. White for some time has been associated with Frank E. Smith, the new head of the Premier company. E. E. Westman, late purchasing agent for Premier, takes charge of the technical department.

**New Chief Draftsman for King**—Percy F. Todd has been appointed chief draftsman of the King Motor Car Co. During the last 3 years he held a similar position with the Northway Motor Mfg. Co., and previous to that was with the Buick and E. M. F. companies. C. E. Jacobs, who was the King company's chief draftsman, has been appointed chief inspector of the company.

**English Foresee Used Truck Flood**—Considerable apprehension is felt in commercial vehicle circles of London that the war will be followed by a great influx of second-hand motor trucks. It is held that production of military motors will not cease until the war actually terminates, and that as the wastage is estimated variously at from 30 to 40 per cent, a large number of trucks will be left to be shipped back to England and disposed of at such prices as they will bring.

**Help Wanted, Cry from Clintonville**—The Four Wheel Drive Co., Clintonville, Wis., is hiring all available skilled help for its largely increased operations on a \$600,000 order for trucks for Great Britain. The factory is running 24 hours a day and \$25,000 worth of new machine tools and other equipment is being purchased, but difficulty is being experienced in procuring sufficient competent help. The office force also is being increased. An amusement and recreational society has been formed by employees. The phenomenal growth of the plant has entirely changed the life of Clintonville, a small city which 3 years ago was a sedate country village.

**Dealers to Fight License Increase**—At the annual meeting of the Automobile Dealers' Association of New York State which was held in Buffalo, N. Y., recently, all of the directors were re-elected with the exception of the director representing Rochester, no delegate for this city having been named. The directors include: Ralph E. Brown, Buffalo; Chauncey D. Hakes, Albany, R. H. Johnston, New York; George H. Norris, Syracuse; Herbert L. Carpenter, Brooklyn, N. Y.; Emanuel Lascaris, New York; H. J. Hartwell, Troy. The meeting placed itself on record as being opposed to the Hewitt-Sullivan measure which, if passed, will double the license fees on passenger cars and impose a heavy burden on the operators of commercial vehicles. It was the con-

sensus of opinion that if the measure is enacted into a law, the association will refuse to pay the increased fees and will attack the constitutionality of the measure in the courts.

**Marvel Company Changes Name**—Papers have been filed changing the name of the Marvel Automobile Supply Co. of Cleveland, O., to the Marvel Accessories Mfg. Co. At the same time the capital stock was increased from \$5,000 to \$15,000.

**Vulcan Gearshift on Lewis Six**—The L-P-C Motor Co., Racine, Wis., maker of the Lewis six, announces that it is in a position to furnish the Vulcan electric gearshift on its product. The Vulcan gearshift is made by the Cutler-Hammer Mfg. Co., Milwaukee, Wis.

**Power Plant for Tire Company**—The Toledo-Ford Tire Co. of Findlay, O., has taken out a permit for the erection of a large power plant. Machinery is being installed in the completed building and orders are coming in from car owners who have purchased stock in the corporation.

**Moves to Waterloo, Ia.**—L. C. Erbes, who purchased the Cutting Motor Car Co., the Clarke-Carter Automobile Co. and the Milwaukee Motor Co., has shipped all the repair parts for cars made by these concerns from Jackson, Mich., to Waterloo, Ia., where he has taken possession of the Mason Motor Co.'s plant.

**Forced to Enlarge Factory**—Although the Hoover Steel Ball Co., Ann Arbor, Mich., is only a little over 2 years old, its business has been growing so rapidly that a new factory building, 256 by 60 feet, is now in course of construction. When completed there will be 230 men on the company's payroll as against less than ninety in 1913.

**To Dissolve Metal Products Co.**—A petition for dissolution was filed in the circuit court recently by the Metal Products Co., Detroit, whose plant, buildings and machinery was purchased by the Timken-Detroit Axle Co., in March. All the assets of the Metal company have been sold to the Timken company, the entire capital stock of the concern being given as \$478,500, with no incumbrances.

**To Start Work on Louisville Ford Plant**—Ground will be broken in a few days for a mammoth assembling plant to be erected at Third street and the L. & N. crossing, Louisville, Ky., by the Ford Motor Co., at an estimated cost of about \$500,000. The plant will be one of the largest of its kind in the south. The building will be four stories in height. September 1 has been fixed as the day of completion.

**New Jersey Garagemen Organize**—For the purpose of protecting their own interests and the interests of their patrons, thirty-five garagemen of Newark and East Orange, N. J., have formed the Garage Owner's Protective Association of New Jersey. John H. Wills, of Will's Garage, Newark was elected president, the other officers being: Vice-president, Augustus Winklehoefer, Standard Garage, East Orange; secretary, Paul F. Devine, Washington Park Garage, Newark; treasurer, W. G. Thacher, Pope-Hartford Garage, Newark. It is planned eventually to include garagemen from the entire state in the organization. Co-operative purchasing of garage supplies will be taken up later, the work which now is being concentrated on being the enforcement of a local statute which prohibits the storage of gasoline in more than 5 gallon lots in other than approved containers.



under ground. This law is being ignored by persons other than garagemen who retail fuel at prices much lower than must be charged by legitimate garagemen because of their overhead expense.

**Addition to Delco Plant**—The Dayton Engineering Laboratories Co., manufacturer of the Delco starting and lighting systems for motor cars, has authorized the erection of another large addition to its plant. The new structure will be 500 feet long and 66 feet wide and six stories high.

**Germans Boycott U. S. Trucks**—It is reported in New York that the Verein Deutscher Motorfahrzeug-Industrieller, an association of German motor car manufacturers and the associated motor clubs of Germany, have combined to declare a boycott on American vehicles, parts and accessories, claiming that in selling to the allies Americans have arraigned themselves as antagonistic to Germany.

**Columbus Tire Dealers Organize**—The Columbus Para Club was organized recently at a meeting of sixteen dealers in motor car and motor truck tires in Columbus, O. A. T. Emmet of the Columbus branch of the Good-year company was elected chairman and C. L. Crippen, manager of the Columbus branch of the United States Tire Co., secretary. The board of directors consists of W. W. Johnston, W. W. Magill, F. P. Corbett, G. A. Richards, R. C. Crippen.

**Increase Capital Stock \$750,000**—At a recent meeting of the board of directors of the Detroit Steel Products Co., the capital stock was increased from \$500,000 to \$1,250,000, the increase consisting in \$500,000 in common stock and \$250,000 in preferred. The latter stock was provided in the form of a 50 per cent dividend. The plant is being operated 24 hours a day and business in March was the best the company had since it was started.

**Seek Garage Lien Law Passage**—Motor car dealers and garage keepers throughout Wisconsin are backing a proposed law now before the Wisconsin legislature which gives them a legal hold on cars upon which the charges for storage, housing or repair have not been paid. The bill is called the garage lien law and secures to garages the right to withhold possession of cars until charges for work or storage are liquidated. The recently organized Wisconsin Automobile Business Association has employed representatives to lobby in favor of the law and push its passage.

**Harrison Chalmers Advertising Manager**—J. R. Harrison has been appointed advertising manager of the Chalmers Motor Co., succeeding Newton A. Fuessele, who resigned owing to ill health. Mr. Harrison comes from the Burroughs Adding Machine Co., where he has been assistant advertising manager during the last year and one-half. Previous to that connection, he was with the National Cash Register Co., Dayton, O., being confidential secretary to Lee E. Lowell, who now is general manager of the Chalmers company.

**Bigger Plant for Accessory Maker**—The Electric Auto-Lite Co. has closed a lease for the plant of the General Electric Co., located on Champlain street, Toledo, O. The lease on the plant was taken by the Willys-Overland Co. and sub-let to the Electric Auto-Lite Co. It is for 3 years and is based on a valuation of \$360,000. The largest building is 304 by 85 feet and four stories high. The Electric Auto-Lite Co. has occupied a plant near the Cherry street bridge. This is too small because of the development of the business. The company will continue the use of the old plant, which, with the 150,000 square feet of floor space in the newly acquired plant, will give ample space. The

Electric Auto-Lite Co. is a consolidation of the original Auto-Lite Co. and the Saxon Mfg. Co. It manufactures horns, electric starters, and other accessories, mostly taken by Willys-Overland.

**Spencer Leaves Denby Truck**—R. P. Spencer, one of the incorporators and a director in charge of the sales of the Denby Motor Truck Co., manufacturer of the Denby trucks, is no longer connected with that concern, although retaining his stock in the company.

**Quaker Dealers Elect Officers**—The annual election of officers of the Philadelphia Automobile Trade Association in the headquarters, southwest corner of Broad and Callowhill streets, resulted in the following being selected for the ensuing year: President, William P. Herbert; vice-president, J. C. Bartlett; secretary and treasurer, J. E. Gomery; Louis C. Block and A. E. Maltby were added.

## Recent Incorporations

**Boston, Mass.**—Gibson-Hollister Mfg. Co., to deal in spark plugs and other motor car accessories; capital stock, \$200,000; incorporators, George S. Hollister, Penfield, Mower, Albermarle Chambers, and L. H. Gibson.

**Chelsea, Mass.**—Central Garage; capital stock, \$10,000; incorporators, Fred Glazier, Louis Goldblatt and E. M. Batts.

**Cleveland, O.**—Seldner-Merritt Co., to deal in motor cars and accessories; capital stock, \$15,000; incorporators, J. R. Seldner, Anna Flannery, C. M. Woodside, J. G. Hartwell and J. L. Greer.

**Colorado Springs, Colo.**—Colorado Springs Auto Equipment Co., to handle motor car accessories; capital stock, \$25,000; incorporators, S. T. McCollum and S. E. Howe, Jr.

**Dayton, O.**—C. W. Heffritz Sales Co., to deal in motor cars; capital stock, \$10,000; incorporators, C. W. Heffritz, M. A. Thomas, A. S. Shuey, E. Heffritz and Harry M. Wolfe.

**Everett, Wash.**—M. A. Grossman, to deal in garage and motor car business; capital stock, \$20,000; incorporators, M. A. Grossman, William D. Thomas.

**Granville, N. Y.**—Granville Gasoline and Oil Co., to deal in lubricants, gasoline, etc.; capital stock, \$5,000; incorporators, Daniel H. Cowles, Frank M. Starbuck and Oscar P. Munson.

**Houston, Texas**—Overland Sales Co.; capital stock, \$1,000; incorporators, George W. Graham, J. E. Hero and D. Riegel.

**New York, N. Y.**—Day Electric Corp., developing electric motor vehicles, etc.; capital stock, \$20,000; incorporators, Henry E. Dey, H. W. Hillman and Max W. Schmidt.

**New York, N. Y.**—Gotham, Inc., to deal in motor cars, etc.; capital stock, \$50,000; incorporators, Allen B. Campbell, Herbert Powers and David R. Sugarman.

**New York, N. Y.**—Hart-Bell Carbon Remover Co., to manufacture carbon removers for engines, etc.; capital stock, \$2,000; incorporators, George D. Hartlett, George Littman, Samuel Copeland.

**New York, N. Y.**—One-Hundred and Fifty-Seven West Eighteenth Street Garage Co., garage business; capital stock, \$1,500; incorporators, Frank G. Brunnella, Cesare Farina and Felix Kessler.

**New York, N. Y.**—Pullman Supply Tire Corp., to deal in motor car supplies, etc.; capital stock, \$25,000; incorporators, Francis B. Wood, William J. Murray, Thomas C. O'Connor.

**New York, N. Y.**—Quintard Co., to manufacture motor car supplies and accessories; capital stock, \$50,000; incorporators, A. R. McCanness, George W. Quintard, and W. H. DeFontaine.

**Portland, Me.**—Miller Transmission Co., to deal in motor car parts, etc.; capital stock, \$25,000; incorporators, West D. Eaton, James Milliken and Henry L. Hunen.

**Portland, Me.**—Prince Auto Supply Co.; capital stock, \$10,000; incorporators, Ernest W. Prince, Bertha G. Prince.

**Rochester, N. Y.**—Flower City Jitney Co.; capital stock, \$1,000; incorporators, William M. McClelland, Fred W. Cottrell and John B. Ehrhart.

**Rochester, N. Y.**—Rochester and Suburban Jitney Co.; capital stock, \$1,000; incorporators, William H. Mikel, James W. Gould and Richard R. B. Powell.

**Syracuse, N. Y.**—Van Dyke & Nolan Taxi Co.; capital stock, \$2,400; incorporators, Fred A. Van Dyke, Michael B. Nolan and George R. Fearon.

**Texas City, Tex.**—Texas City and Galveston Auto Line; capital stock, \$1,000; incorporators, J. L. Corbett, G. E. Whitney and W. J. Lingel.

**Troy, N. Y.**—Avenue Garage Co., general garage business; capital stock, \$1,000; incorporators, James N. Bussey, David Patnaud and Earl Coons.

to the board of directors and E. M. Bartlett and S. de B. Keim constitute new members of the membership committee. The annual report of the treasurer showed the organization to be financially sound.

**Havers Assets on Sale**—Motor car manufacturing machinery, shop equipment, motor car parts and accessories from the bankrupt Havers Motor Car Co., Port Huron, Mich., are now ready for sale either at the plant or at the offices of the Harris Bros. Co., Jefferson avenue, Detroit, which purchased the entire stock.

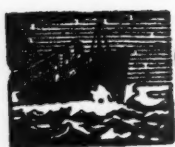
**Plan Addition to Maxwell Plant**—The work of erecting another addition to the Maxwell plant in Dayton, O., will be started within a few weeks. It is planned to increase the working force at the plant from 450 to about 2,000 men. The addition will be of brick and will conform in architecture to the general style of the Maxwell plant. When the addition is completed many of the workmen who were laid off several months ago will be re-employed.

**Belgian Firm Locates in America**—The International Peace Brotherhood, with offices at The Hague, Holland, will build motor cars, marine motors, aluminum castings and pressed and spun wares in Dover, N. J. Through the medium of the Dover board of trade, the brotherhood will locate its first American office and factory in that city. The site comprises 7 acres. Work on the construction of the buildings will commence in the near future. The new industry will give employment to about 200 men. The plant must continue in operation for a period of 20 years.

**Receiver for Tractor Company**—Upon the application of the Marion County Bank, Charles H. Lewis of Harpster, O., has been appointed receiver for the Ohio Tractor Mfg. Co. of Marion, O. The bank seeks to collect on a chattel mortgage of \$20,000 against the machinery in the plant. Ward H. Bones of Marion, Ezekiel Brown of Morral and the Ohio Roller Sales Co. are named as co-defendants. The total amount of claims secured by chattel mortgage amount to \$58,000. It is understood that the assets will satisfy the debts, but that the stockholders have no hopes of a return on their investment.

**New Factory for Swinehart**—Further proof of the continued growth of the rubber business was presented recently when the Swinehart Tire and Rubber Co., Akron, O., started construction work on a \$50,000 three-story factory and office building. The company now has a large two-story factory building and a small office building, but on account of the growth of the business the company is cramped for quarters. The new building will be constructed of steel, tile and brick and will be 122 feet wide and 105 feet long. The first floor will be used for factory purposes, the second as a warehouse, and the third for offices.

**Electric Baking Ovens for Overland**—An improvement of much importance to the motor car industry has been installed at the big Toledo factory of the Willys-Overland Co. This company recently closed what is probably the largest industrial contract for electric power ever given to a central station. The contract calls for the electrification of sixteen large enameling furnaces, having a volume of 48,000 cubic feet and a capacity of 140 tons of enameled product every 10 hours. The work put through the oven consists of various sized and shaped steel parts. With the 4,500 horsepower previously required from the same station, the new furnaces will make the total now used by the Overland company approximately 10,000 horsepower load. According to electrical engineers, this is fully as large as the total power required for lighting a city of 225,000 inhabitants.



# From the Four Winds



**MARKING Roads Near Baltimore**—All roads within a radius of 60 miles of Baltimore will soon be posted with direction and danger signs. The work will be done by the Automobile Club of Maryland and the signs will be set upon specially designed and constructed iron posts.

**Convicts May Make License Tags**—The Ohio board of administration is considering the advisability of having the convicts in the state penitentiary manufacture motor car and motorcycle tags and thus make quite a saving in the administration of the Ohio motor registration department. It is believed the cost of the tag would be reduced fully one-half by that method.

**Start Work on Club House Soon**—Ground will be broken in April for the new home of the Rockford Motor Club to be erected several miles from the Illinois city on the banks of the picturesque Rock river. The structure will be of four floors and will provide for a dance hall, bowling alleys, billiard room, dining hall, smoking room, lounging and game room, and locker rooms. It is planned to complete the structure early in the summer.

**Students Visiting Motor Car Plants**—Forty-five students from the mechanical engineering department of the Case School of Applied Science, Cleveland, O., visited the various plants of the Studebaker Corp., Detroit, recently. The students are making a special study of motor car design and construction this year and will visit several of the leading motor car manufacturing plants in the country.

**Want Prisoners on Highways**—Attempts are being made in Maine and Massachusetts this year to have the legislatures pass laws that would allow prisoners to be used on state highways. There is need of fixing the Portland-Portsmouth highways in Maine this year, but no money has been appropriated so the prisoners could do the work well. In Massachusetts the plan put forth was to utilize them this year to widen the Boston-Worcester road, and next year other sections until the state highways have been widened all through the commonwealth.

**To Repair Oregon Toll Road**—A toll road is still in use in Oregon. At the southern foot of Mt. Hood towards the Dalles, it is known as the Mt. Hood-Barlow toll road. The road is about 20 miles in length and is extremely popular as it is the only entrance in that direction from Multnomah and Clackamas counties. The owner, George W. Joseph, says that if he were a millionaire he would hard surface the road from end to end, but for the present he will content himself with making such improvements as he may from the collections. These are between \$2,500 to \$3,000 for the past season.

**Changes in Maine Law Advocated**—The Maine Automobile Association is working hard to have changes made in the Maine motor law that will bring about better conditions. One provision calls for a severe penalty for driving while under the influence of liquor. Another calls for fine or imprisonment with a revocation of license for running away after an accident to hide identity, and also for using a motor car without the authority of the owner. These will apply to joy-riding, although there has not been very much of it in Maine. There is also a paragraph that abolishes the fee system for officers for making arrests which will do away with the trap system. The assessors of

every city, town or plantation must also report to the secretary of state before April 15 each year the number of motor vehicles owned in their respective communities.

**Races at Portland May 1-2**—The first event run under the auspices of the Northwest Automobile Association will be staged at Portland, Ore., on May 1-2. Manager Robert Hiller reports the following entries: Thomas, G. H. Wallace; Romano, Charles Latta; Parsons Special, Jim Parsons; Mercer, Harry D. Stratton; Mercer, unnamed; Velle, Fred Barnsby.

**Sunset Highway Opens June 1**—The announced opening on June 1 of the Sunset highway across the Cascades by way of Snoqualmie Pass is a matter of congratulation to the Pacific Northwest, as establishing a convenient link of communication between eastern and western Washington. For many years the heights of the Cascade mountains were reached by a rough and circuitous trail, reaching at places a 35 per cent grade which was discouraging to travel. Now, by the newly constructed Sunset highway, cars may pass over the mountains on a road no portion of which exceeds 5 per

cent and connecting with a system of good roads from the Atlantic to the Pacific ocean.

**Louisville Club Elects Officers**—At the annual meeting of the Louisville Automobile Club, held Tuesday night at Magnolia Garden, the following officers were elected: Otis W. Pickeral, president; H. S. Kendall, first vice-president; Dr. Gaylord C. Hall, second vice-president; George P. Kendrick, secretary, and Walter Kohn, treasurer.

**Licenses 1,147 Cars a Day**—During the week ending April 10, 6,881 applications for motor car licenses by private owners of Wisconsin were filled by the secretary of state's office, or an average of 1,147 per day. The rush for licenses does not show signs of abatement. At the close of business April 10, the total private registry was 43,808, compared with a total 1914 registration of 53,161. The secretary of state is figuring on 70,000 licenses this year, but if past experience counts, this estimate falls short.

**Believe Light Bill Will Pass**—Motorists in Ohio believe that their fight for the enactment of the Mooney light bill will be crowned with success. The bill, which was passed in the senate, was sidetracked in the house of representatives by the large farmer vote. Now it has been revived and has been placed on the calendar. The bill provides that all vehicles operating on the highways or streets of the state after night must carry lights visible from the front and the rear. The only exception is loaded hay and straw wagons.

**State Funds for Kentucky Roads**—Every county in Kentucky which has applied for state aid in building its inter-county roads will get \$13,164 as its maximum, which is 2 per cent of the road fund, the largest amount any one county may draw in 1 year. These figures were published by Robert C. Terrell, commissioner of roads, on the basis of figures furnished by State Auditor H. M. Bosworth. The total road fund will be \$653,220, available out of this year's revenues, which includes \$109,760.12 now to the credit of the road fund from the motor registration department.

**Will Fight New Road Bill**—Stripped of its alleged extravagant features, the Cass highway codification bill will soon come up in the Ohio senate for action. The provision, authorizing the appointment of from one to four road inspectors in each of the 1,374 townships in the state, has been stricken out, which is expected to save about \$500,000 yearly. The provision of the bill having the proceeds of the motor license department distributed to the various counties for road maintenance, to be administered by the county commissioners, will be fought by good roads advocates generally.

**Sues for Damages to Old Car**—Ancient motor car history, recalling the fact that Milwaukee was one of the first cities in America to produce a modern motor car, is a factor in the suit brought by the Modern Garage Co., Milwaukee, against Francis A. Walsh for \$35.05 for repairing a Milwaukee steamer, built in 1904. Walsh has entered a counter claim of \$300, less \$1.50, which he says is the cost of the work he ordered done. He alleges that because of poor workmanship by the plaintiffs, he was unable to sell the steamer for \$300, which he was offered for the car if he could place it in repair. The case is before Judge Cordes in the civil court.

## Coming Motor Events

### CONTESTS

- \* April 20-22—Road races, Oklahoma City, Okla.
- May 1—Track meet, Irvington, N. J.
- May 1-2—Track meet, Portland, Ore.
- May 8—Track meet, Salem, Ore.
- May 9—Track meet, St. Louis, Mo.
- May 15—Track meet, Singac, N. J.
- May 15-16—Track meet, Columbus, O.
- May 15-16—Track meet, Centralia-Chehalis, Wash.
- May 22-23—Track meet, Cleveland, O.
- May 23—Track meet, Seattle, Wash.
- \* May 29—500-mile speedway race, Indianapolis, Ind.
- May 29-30—Track meet, Seattle, Wash.
- May 31—Track meet, Irvington, N. J.
- June 5—Track meet, Pittsburgh, Pa.
- June 5-6—Track meet, North Yakima, Wash.
- June 9—100-mile dirt track race, Galesburg, Ill.
- June 12—Track meet, Brighton Beach, N. Y.
- June 17—Track meet, Boston, Mass.
- June 19—Track meet, Hartford, Conn.
- \* June 19—500-mile speedway race, Chicago.
- \* July 3—300-mile race, Sioux City, Ia.
- July 4—Track meet, Oshkosh, Wis.
- \* July 4-5—Speedway races, Tacoma, Wash.
- July 4—Road race, Visalia, Cal.
- July 4—Road race, Chico, Cal.
- \* July 5—Speedway races, Omaha, Neb.
- July 9—100-mile dirt track race, Burlington, Ia.
- July 31—Road race, Denver, Colo.
- August 14—Dirt track races, Janesville, Wis.
- August 20-21—Elgin road races, Elgin, Ill.
- August 23—100-mile dirt track race, Kalama, Wis.
- September 6—Speedway races, Detroit, Mich.
- September 6—Speedway races, Providence, R. I.
- September 24-25—Track meet, Grand Rapids, Mich.
- October 1-2—Track meet, Trenton, N. J.

\* Sanctioned by A. A. A.

### SHOWS AND CONVENTIONS

- May 17-18—Annual meeting of American Automobile Association, Boston, Mass.
- June 14-17—Summer meeting of Society of Automobile Engineers, Detroit and Great Lakes cruise.





# Brief Business Announcements



**DOWAGIAC, Mich.**—A. Holsterman has opened a garage here under the name of Al's Garage.

**Manistee, Mich.**—The Manistee Tire and Repair Co. has been formed here by Joseph and Louis Gamache.

**Spokane, Wash.**—Kilmer & Sons, 1001-7 First avenue, has been named as representative for the Willard storage batteries in Spokane and the Inland Empire.

**Sale Lake City, Utah.**—C. K. Seibert, formerly auditor of the Studebaker Corp. at South Bend, has been appointed acting manager of the Studebaker branch at Salt Lake City.

**Manawa, Wis.**—Louis Ory and Carl M. Nelson, who have conducted a machine and blacksmith shop here for several years, have established a garage and repair shop, known as the North Side Garage. The firm will carry a full line of supplies.

**Waupun, Wis.**—The Meiklejohn-Warford Auto Co. has leased the Warren livery stables and is remodeling them into a commodious and up-to-date garage, fireproof and with a full equipment of machinery for repair work.

**Fort Atkinson, Wis.**—The garage firm of Smith & Edwards, operating as the North Side Garage, Fort Atkinson, Wis., has taken over the motor car repair and supply department established by the Northwestern Mfg. Co., wagons, buggies and bodies, and has broken ground for a new garage building, 60 by 60 feet and two stories, at North Water and Edwards streets. The firm is

agent for the Metz and Briscoe and will do a general repair business on cars and tires, as well as furnish service for electric car owners.

**Portland, Ore.**—The Hood Street Garage has opened at 668 Hood street and is in charge of Robert Isaackson.

**Detroit, Mich.**—F. H. Primeau & Co. has opened its new garage at 180 John R. street. It has a machine and repair shop, a paint department and room to take care of 200 cars. The total floor space is 16,000 square feet.

**Detroit, Mich.**—A. M. Russell, formerly with the Lippard-Stewart Co., recently joined the sales force of the Signal Motor Truck Co. as district manager in charge of the states of Iowa, Illinois and Minnesota.

**Hartford, Conn.**—Ralph D. Britton, one of the first men in Hartford to sell motor cars, has purchased the controlling interest in the Hartford Motor Car Co., Allen and Velie agent, at the corner of Allyn and High streets. For the past 2 years, Mr. Britton, who is a former councilman and the author of the present dazzling headlight ordinance, has been engaged in other lines of business.

**Detroit, Mich.**—One of the biggest garages in the city, the Wolverine Garage Co., opened for business last week. The owners are James R. Gilbert, until recently manager of the local branch of the Pennsylvania Rubber Co., who is president and general manager, and Albert T. Hamlin, who has been connected with the Packard, Knox, Northway and several other big manufacturing con-

cerns. The garage, which has 14,000 square feet of floor space, will be open day and night. It is located at 248 Jefferson avenue, east.

**Seattle, Wash.**—Under the management of Edward Allen, the Racine Tire Sales Co. has opened at 1609 Eighth avenue.

**Detroit, Mich.**—W. A. Armstrong has been appointed manager of the local branch of S. F. Bowser & Co., gasoline tank manufacturer.

**Detroit, Mich.**—F. W. Andrew, formerly designing engineer for the Delco company, has affiliated with the engineering staff of the Remy Electric Co.

**Buffalo, N. Y.**—The McGraw Tire and Rubber Co. of East Palestine O., has opened a branch store at 737 Main street, for the sale of pneumatic tires, inner tubes and solid truck tires.

**San Francisco, Cal.**—The Bosch Magneto Co.'s local branch, which for several years has been situated at the lower end of Van Ness avenue, has been moved to the upper end of the boulevard and is now situated in the center of the new motor section.

**Spokane, Wash.**—W. A. Cromer and E. G. Butler have formed the Cromer-Butler Tire Co. and opened a store at 511 Stevens street.

**Spokane, Wash.**—The Hughes Motor Car Co. is the latest addition to Spokane's motor car establishments, being located at 218 Sprague avenue. The firm comprises V. H. Hughes and S. Nelson, who will handle the Grant in northern Washington and northern Idaho.

## Recent Agencies Appointed by Motor Car Manufacturers

### PASSENGER CARS

| Town                  | Agent                     | Make       | Town                    | Agent                       | Make        |
|-----------------------|---------------------------|------------|-------------------------|-----------------------------|-------------|
| Alpena, Mich.         | Andrew Hansen             | Oakland    | Jackson, Mich.          | Letts Auto & Taxi Co.       | Jackson     |
| Albany, O.            | Whitlatch Bros.           | Saxon      | Long Beach, Cal.        | Wm. P. West                 | Metz        |
| Biglerville, Pa.      | S. G. Bigham              | Saxon      | Ladysmith, Wis.         | Ryall's Garage              | Ford        |
| Big Rapids, Mich.     | Phelps & Ferris           | Saxon      | LaPorte, Ind.           | Henry Bros. & Sharp         | Saxon       |
| Boston, Mass.         | J. J. McCarthy            | Lozier     | Monroe, La.             | J. Lowe                     | Saxon       |
| Bellefontaine, O.     | J. B. Hornberger          | Saxon      | Mt. Vernon, O.          | F. J. Harris                | Saxon       |
| Boston, Mass.         | M. Ross Maddocks Co.      | Saxon      | Monrovia, Cal.          | A. T. Badillo               | Reo         |
| Brunswick, Me.        | W. F. Senter              | Oldsmobile | Monrovia, Cal.          | A. T. Badillo               | Metz        |
| Claremont, N. H.      | C. H. Bailey              | Saxon      | Northfield, Minn.       | C. E. Hathaway              | Oldsmobile  |
| Chambersburg, Pa.     | National Auto Co.         | Saxon      | New Richmond, Wis.      | M. C. Emerson               | Dodge       |
| Council Bluffs, Ia.   | Raapke Motor Co.          | Oldsmobile | New Britain, Conn.      | Williams Automobile Co.     | Hudson      |
| Chillicothe, O.       | Drummond Fence & Wire Co. | Saxon      | Oconto Falls, Wis.      | Bunn & Kaufmann             | Reo         |
| Cleveland, O.         | Albaugh Motor Sales Co.   | Monarch    | Oil City, Pa.           | Garvey & Malerich           | Saxon       |
| Cleveland, O.         | Albaugh Motor Sales Co.   | Saxon      | Philadelphia, Pa.       | W. W. Gawthrop              | Davis       |
| Cleveland, O.         | Albaugh Motor Sales Co.   | Detroit    | Potlatch, Idaho         | Potlatch Mercantile Co.     | Mitchell    |
| Cleveland, O.         | Albaugh Motor Sales Co.   | Princess   | Reading, Pa.            | Reading Optical Co.         | Saxon       |
| Cleveland, O.         | Stark Auto Co.            | Apperson   | Rialto, Cal.            | A. W. Cramp                 | Metz        |
| Cleveland, O.         | Adams-Oakland Co.         | Oakland    | Stafford Spgs., Conn.   | Hudson Garage Co.           | Hudson      |
| Columbus, O.          | Marmon Motor Car Co.      | Marmon     | Saginaw, Mich.          | S. H. Heginbottom & Sons    | Saxon       |
| Cincinnati, O.        | Citizens Motor Car Co.    | Briscoe    | Schleisingerville, Wis. | Klett Brothers              | Oldsmobile  |
| Cincinnati, O.        | E. L. Jones               | Enger      | Sturgeon Bay, Wis.      | L. H. Nebel                 | Saxon       |
| Crystal Falls, Mich.  | Bregger Auto Sales Co.    | Dodge      | San Pedro, Cal.         | A. L. Drake                 | Metz        |
| Dowagiac, Mich.       | Carl Luke                 | Saxon      | Seneca Falls, N. Y.     | G. A. Gargin                | Saxon       |
| Ellenville, N. Y.     | Van Wyck & Crookston      | Saxon      | Tacoma, Wash.           | St. Helens Garage           | Metz        |
| Ehrichsville, O.      | J. W. Lytle & Co.         | Saxon      | Trenton, N. J.          | Trenton Auto Sales Co.      | Saxon       |
| Fitchburg, Mass.      | Lesure Bros. Garage       | Saxon      | Toronto, Ont.           | Automobile & Supply Co.     | Saxon       |
| Fresno, Cal.          | Neideraur Motor Car Co.   | Oldsmobile | Three Rivers, Mich.     | Cook & Hagenbuch            | Crow-Elkart |
| Grand Junction, Colo. | Western Slope Auto Co.    | Saxon      | Terre Haute, Ind.       | Cole Auto Co.               | Oldsmobile  |
| Grand Rapids, Mich.   | Kibby & Pierce            | Apperson   | Vincennes, Ind.         | Johnson Auto Co.            | Saxon       |
| Grand Rapids, Wis.    | Leon Arpin                | Hupmobile  | Vancouver, B. C.        | Begg Motor Co.              | Hupp        |
| Green Bay, Wis.       | West Side Garage          | Grant      | Victoria, B. C.         | Thomas Plimley              | King        |
| Harrisville, Mich.    | C. M. Lund                | Ford       | Vancouver, B. C.        | A. S. French Automobile Co. | King        |
| Hudson, Mass.         | F. B. Dawe                | Saxon      | Winnipeg, Can.          | Canadian Motors, Ltd.       | Oldsmobile  |
| Holly, Mich.          | Holly Garage              | Grant      | Webster, Mass.          | Ryan & Ryan                 | Saxon       |
| Hartford, Conn.       | Brassill Service Station  | Sphinx     | Worcester, Mass.        | New England Supply Co.      | Saxon       |
| Hamilton, O.          | Heck Motor Car Co.        | Saxon      |                         |                             |             |
| Hurdland, Mo.         | Delaney Bros.             | Saxon      |                         |                             |             |

# The Motor Car Repair Shop



## Handy Telephone Holder

MUCH time can be wasted by persons having frequent use for the telephone when there is but one instrument on the line and it is necessary to jump up and go into another room to talk over it. The foreman and manager of a Detroit garage have their desks on opposite sides of a wood partition, separating the office from the garage proper. To save the foreman's time, the handy telephone stand and hinged arrangement shown in Fig. 2 was constructed.

A hole was cut in the partition so that the telephone could be passed through it with plenty of clearance all around. Then the pie-shaped wooden holder was made, and hinged to the partition. The telephone box was placed just below the holder so that the minimum amount of the cord would be outside the holder. Thus, there was plenty of play for the instrument which could be taken off the shelf or holder and used easily by either party. It was simply a matter of swinging the holder into one room or the other. Of course, it was conveniently located so that neither man would have to get up from his desk to reach it.

## Cutting Oil Grooves in Bearings

The way oil grooves are cut in bearings makes much difference in the lubrication of them. The oil groove is primarily designed to distribute oil between the shaft and the bearing so as to lubricate both surfaces. Looking at a section of two bearings, Fig. 1 the wrong and right groove shapes are shown. That at A is the correct shape. It should have a rather flat V section and not a semi-circular or U form as indicated at B. The reason for this is that the U-form of groove has a sharp angle with the shaft and there is a tendency to scrape or wipe the oil from the shaft. But with the shallow V-form, the angle is not great enough between the sides of the groove and the shaft, and the distribution function is perfectly accomplished.

## Caring for the Spare Tire

Nearly half the cars one sees on the streets carry a spare tire that it not properly protected. It is carried without covering of any kind, and therefore is subjected to the dust, oil, mud and grease that come the car's way. The most serious thing is that water can collect in it, this soon soaking into the fabric and eventually ruining it. Dust mixes with this water, and is likely to form a kind of mud which will dry and cake on the inside of the casing. Later when the tire is put into use, it is probable that this coating of mud will not be rubbed off, and a rough surface meets the outer surface of the inner tube. Chafing then is increased, and later the

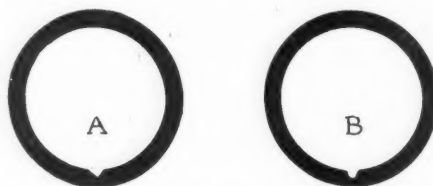
## Cutting Grooves in Bearings

owner wonders why the tube has given out.

There are many good tire covers on the market, and their cost being so small, leads one to think that the exposed tires are merely the victims of carelessness rather than of the cost of proper enclosure.

### On Tire Repair Shops

According to latest figures there are a million and three-quarters cars in operation in the United States. This means that there is a great year ahead of the tire repair man as well as the general garage business. Assuming that each car

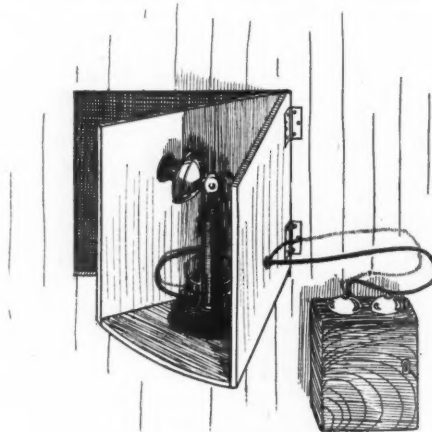


CUTTING GROOVES IN BEARINGS

Fig. 1—A shows the correct method using a V groove and B the incorrect way, using a U-shaped cut.

uses six casings and in addition eight inner tubes, the total number of tires to be repaired during 1915 reaches the figure of 10,500,000, while the tube consumption estimates to 14,000,000.

These stupendous figures should be food for thought by those already in the garage business, and many others who may realize that the motoring public all over the coun-



A HANDY TELEPHONE HOLDER

Fig. 2—This is in use in a Detroit garage where one instrument is used by many men

try is very much in need of good service.

It is reasonable to assume that each casing and tube will have to be repaired a few times before it is relegated to the scrap heap, and an average tire expense for each car in use is probably about \$25. On this basis, the American motoring public will spend during this year nearly \$50,000,000 with the garages and tire repair

shops for this one item alone. The figure is doubtless low when everything is considered, for mostly every car will run up a bigger repair bill for 12 months.

It is not necessary for a man to have years of tire making and repairing experience in order to do good repairing and vulcanizing, but he should at least have a thorough knowledge of all phases of the work. A good working knowledge, many tire experts will tell you, can be gained from working in a repair shop where work of the kind is properly carried on. In addition there are some very reputable tire repairing and vulcanizing schools, each of which seems to have a special method of its own.

The mistake often is made by a garage of installing equipment which is not suitable for the volume of business to be done. There are tire repairing and vulcanizing outfits on the market ranging in price from about \$150 to over \$1,000, but it is a useless waste of money for a garage with a moderate territory to serve to put in equipment of a capacity sufficient for several times the business it ever expects to get. In that case, money is tied up which is not earning. Where a garage man, or any person beginning the tire repair business, is not well informed on the work, he should take steps to become acquainted with it sufficiently so that he will not allow himself to be sold impractical equipment or too much equipment.

As in every other line of business, the garage should be so equipped as to make every dollar possible to be made, and certainly there is money in tire work as in other kinds of repairing. But there is nothing in doing work which will cause a rebound due to its poor quality.

To cite one specific case, the garage man is very foolish who will accept every retread job that is brought to him. Where a tire has been worn until it is very hard to make a retread stay on, the motorist will not get his money's worth, and the repairman gets the blame.

## New Use for Tire Chains

A new use for tire chains was hit upon by a certain driver the other day when he came upon a car which was so disabled that it required a tow to the garage. No rope or chain being handy, the drivers were in a quandary as to how to pull the lifeless car. Finally one of them thought of the scheme for using a tire chain to do the work. The two long main side chains were fastened to the pulling and pulled cars so that each unit took its share of the load. While this application of the tire chain is not to be recommended as a regular practice, a chain is strong enough to take such a pull should an emergency of this kind arise.



# "MADE TO ORDER" GLOVE COMFORT

## "Rist-Fit" Ventilated!

Tiny rows of cleverly cut perforations admit cooling air yet exclude dust, grease, etc. Ask for Grinnell style No. V-4020. Prices, \$2.50 to \$4 per pair.

Grinnell Gloves for motoring are smooth-fitting, soft, pliable, rip-proof, handsome, durable, washable.

You couldn't get more comfort or service if you paid three times as much or had them "made to order."

# Grinnell Gloves

**Best for every purpose**

Made from soft, pliable Reindeer and Coltskin, tanned specially to wear like rawhide. Washable in soap and water or gasoline.

Dry out soft and clean as new. Guaranteed not to harden, crack, scuff or shrink. Uninjured by steam, heat, water, gasoline, heavy lubricants, etc.

Grinnell Gloves have exclusive features. See description of Ventilated Gloves above and of "Limp-Kuff" below.

Then there is the famous "Grip-Tite," non-slip, double corrugated palm that gives a firm, sure grip without muscle tension; and "Rist-Fit," the adjustable device that holds the gauntlet in place.

900 styles—all prices—lined or unlined, ventilated or unventilated, leather, silk, chamoisette, etc.

Sold by dealers everywhere—or sent on approval, prepaid, where not represented.

## Morrison-Ricker Mfg. Co.

(Established 1856)

64 Broad Street

GRINNELL - IOWA



## "Limp-Kuff"

The newest motoring convenience. Soft, limp cuff—wrinkles down naturally on the wrist or may be pulled over the sleeve. Crush up and stuff in pocket. Ask for Grinnell Style No. 4446. Prices, \$2.50 to \$3.50 per pair.



# SCHIEBLER

WORLD'S-RECORD-CARBURETOR

STANDARD  
EQUIPMENT  
ON-AMERICAN

# CHAMPIONS

WHEELER AND SCHIEBLER

INDIANAPOLIS

INDIANA U.S.A.



Watch  
this  
space  
**NEXT  
WEEK**

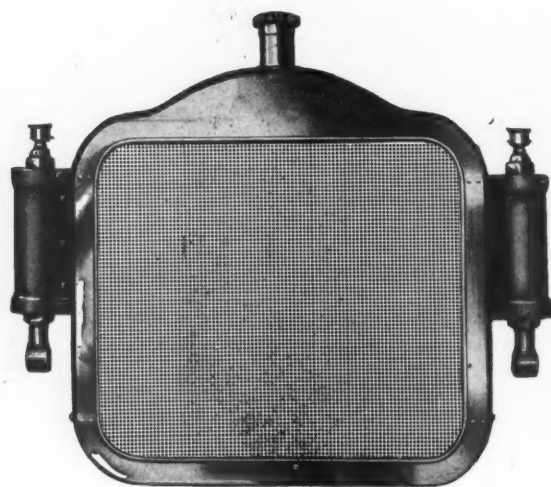
A  
New Member  
will be added  
to the  
*Stewart* Products  
family

The  
most important  
announcement  
ever made to  
Automobile  
Accessory Dealers



(Watch announcement No. 2)

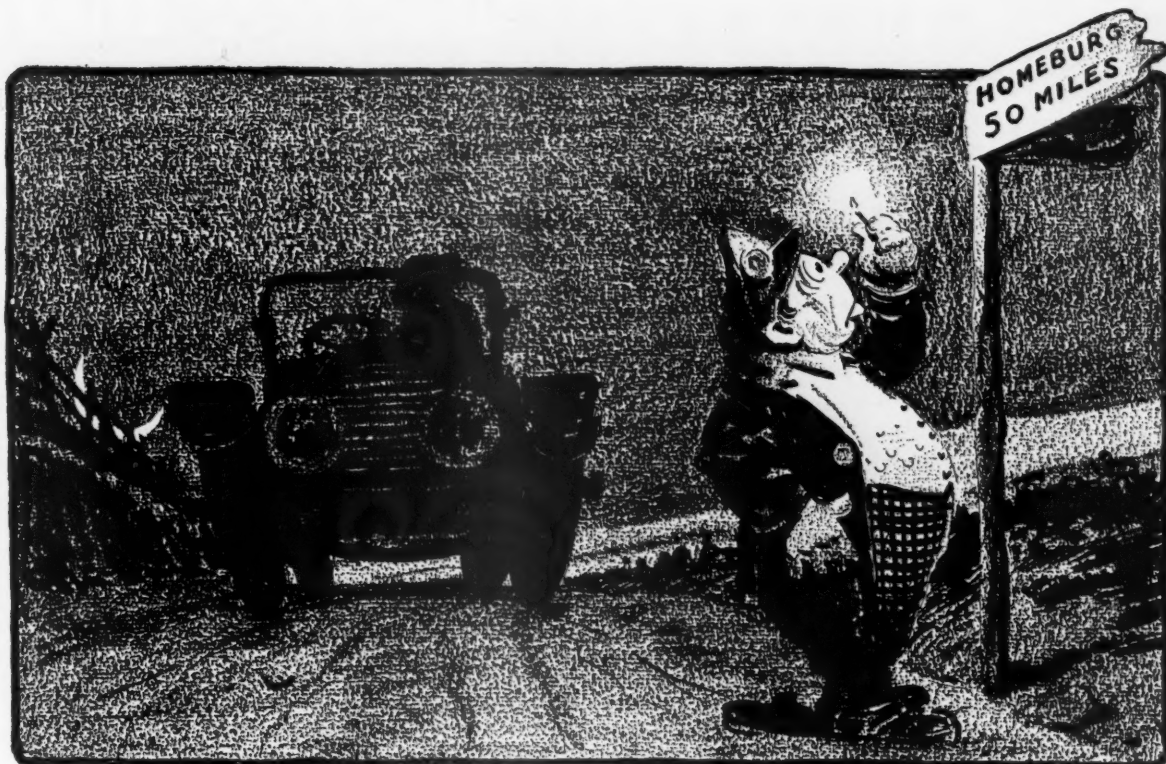
# Fedders Radiators



One of the largest makers  
of motor trucks in the  
world has been a con-  
sistent user of Fedders  
Radiators for years

**Fedders Manufacturing Co., Inc.**  
Buffalo - - - - - New York





## "You Never Miss the Water Till the Well Runs Dry"

And then it's too late to think about stopping the waste. Same way with a storage battery. It turns your starter and operates your lights until you take it for granted and forget about it being there.

Then it begins to act queer—no power, poor lights—what's the matter? It keeps getting worse and finally fails to respond. You're willing to avoid this, but how can you do it?

The answer is simple—a little care on your part will save you annoyance and money. Willard batteries are made to give good service for a long time. All the owner has to do is to give them water and see that they are charged enough to do their work. And if you have some trouble you don't understand, go to a Willard Service Station. That's what they're for.

*Willard Batteries and Service are the choice of 85% of American makers of electrically equipped cars.*

### Willard Storage Battery Company Cleveland, Ohio

NEW YORK: 228-230 W. 58th St. DETROIT: 736-38-40 Woodward Ave.  
CHICAGO: 2524-30 S. Wabash Ave. SAN FRANCISCO: 821 Monadnock Bldg.  
INDIANAPOLIS: 318 North Illinois Street.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES,  
CANADA AND MEXICO.



Now, with Seven-Passenger Body,

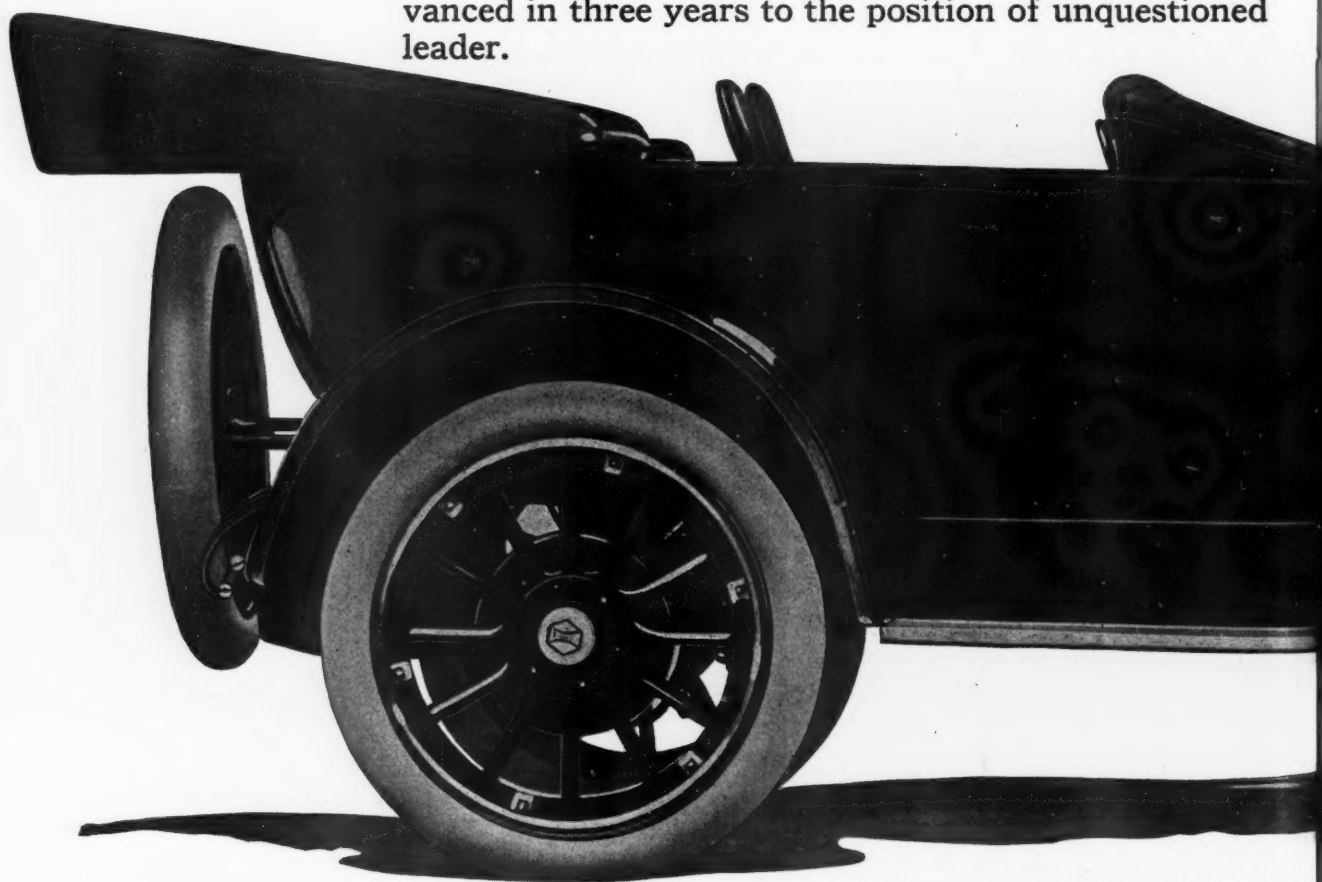
# CHANDLER SIX

The Pioneer *Light-Weight* Six

**\$1295**

The New Season's Chandler seven-passenger touring car is ready for delivery. The sensational Chandler price—\$1295—announced at the opening of the Chicago Automobile Show, holds good for this unusual seven-passenger vehicle.

The demand for the seven-passenger Chandler is an unprecedented demand. Two new factory buildings, just completed, and an extensive addition to our main building have enabled us to tremendously increase our output. The Chandler has advanced in three years to the position of unquestioned leader.



Chandler Motor Car Co., 204-234 E. 131st St., Cleveland, O.

When Writing to Advertisers, Please Mention Motor Age



# Sweeps Aside All Competition

**No car to compare with it has ever been sold at such a price**

Search the market from end to end, and try to find a car that compares with the Chandler. There is none. This isn't a boast. It's the truth. Ever since Chandler, two years ago last January, produced the first high-grade, light-weight six sold at less than \$2,000, the Chandler has pioneered the way.

Others may claim the honor, but the trade can't be fooled. Every dealer in the country **knows** the Chandler was months in advance. Every dealer knows how the Chandler proved that high-grade six-cylinder construction did not necessarily mean heavy weight and high prices. Every dealer knows how Chandler quality has **gone up** and how Chandler prices have **gone down**. And every dealer knows that today, with lengthened wheel-base and this big seven-passenger body, Chandler is out in front—alone in its class for quality and price.

## All the famous Chandler features are retained

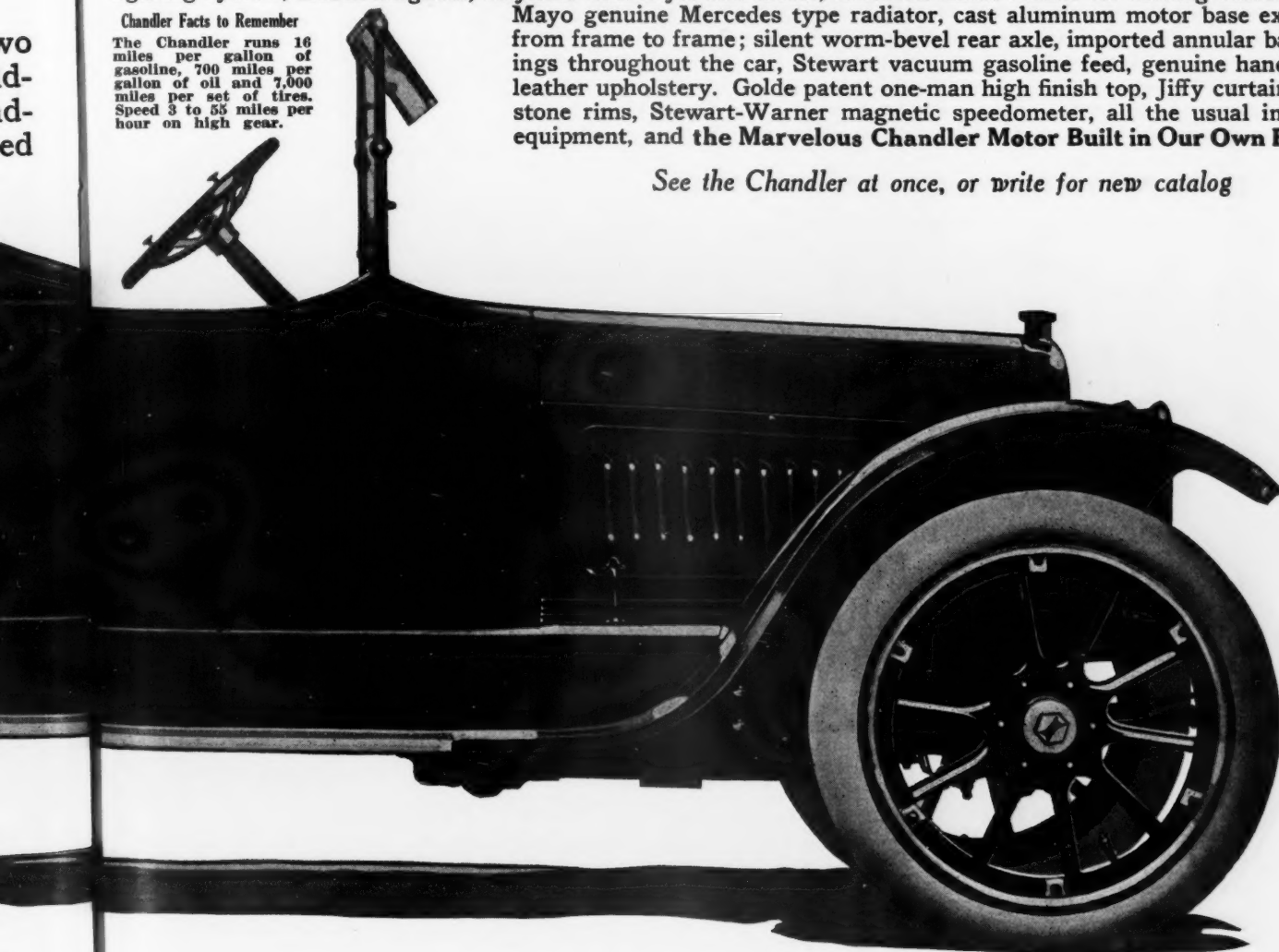
Yes, and all the excellence of material and workmanship. Gray and Davis separate unit electric starting and lighting system, Bosch magneto, Rayfield double-jet carburetor, enclosed silent chains for driving motor shafts,

### Chandler Facts to Remember

The Chandler runs 16 miles per gallon of gasoline, 700 miles per gallon of oil and 7,000 miles per set of tires. Speed 3 to 55 miles per hour on high gear.

Mayo genuine Mercedes type radiator, cast aluminum motor base extending from frame to frame; silent worm-bevel rear axle, imported annular ball bearings throughout the car, Stewart vacuum gasoline feed, genuine hand buffed leather upholstery. Golde patent one-man high finish top, Jiffy curtains, Firestone rims, Stewart-Warner magnetic speedometer, all the usual incidental equipment, and the **Marvelous Chandler Motor Built in Our Own Factory.**

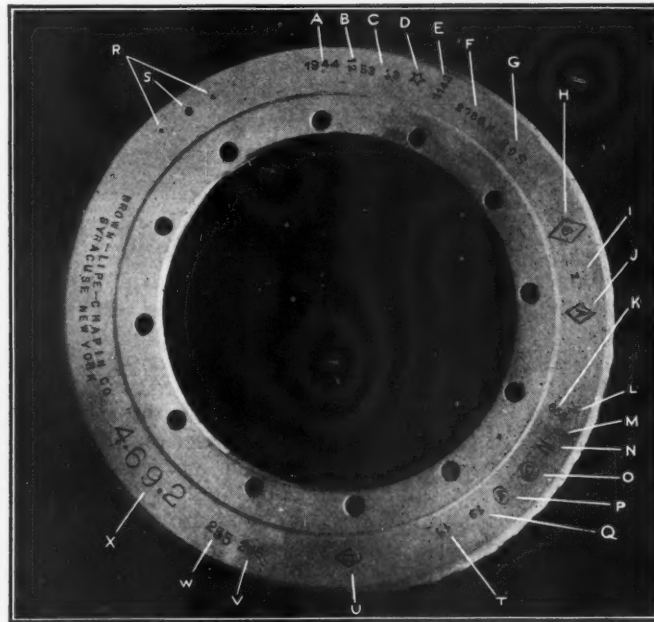
*See the Chandler at once, or write for new catalog*



**O. New York City Office, 1890 Broadway, Cable Address, Chanmotor**

*When Writing to Advertisers, Please Mention Motor Age*

# BROWN-LIPE



As a graphic illustration of the thoroughness with which every single detail of manufacture is watched and checked in Brown-Lipe products we reproduce herewith a photograph (not retouched) of a finished bevel gear before it is finally polished and ground. By glancing through the following index you will note that substantially every single detail in this gear's

## BROWN-LIPE GEAR CO.

TRANSMISSIONS SYRACUSE NE

NEW YORK  
Thos. J. Wetzel, 29 W. 42nd St.

CHICAGO  
H. Franklin Peterson, 122 So. Michigan Av.



# E THOROUGHNESS

history is recorded upon the gear itself so that ten years from to-day if necessary we can tell just the date and who performed every operation and work out the entire story of its production.

- |                                    |   |                                      |  |
|------------------------------------|---|--------------------------------------|--|
| <b>A</b> 1944.                     | This is the blue print number, from which gear is made.   | <b>M</b> 40.                         | Time clock number of the inspector who passed on the first machining operations.   |
| <b>B</b> 12.                       | This indicates back angle.  | <b>N</b> N.                          | This designates class of steel used.   |
| <b>C</b> 53-13.                    | This indicates the gear ratio.  | <b>O</b> G. (inside of a circle).    | This designates the firm who made the forging blank.   |
| <b>D</b> *                         | This indicates the gear was cut at night.   | <b>P</b> 39.                         | Number of inspector who passed on running in the bearing.  |
| <b>E</b> 1142.                     | This is the time clock number of the man who cut the teeth.   | <b>Q</b> 13.                         | Number of inspector of the second operation.   |
| <b>F</b> 2786 K.                   | This is the identification number of the gear, and in this instance means that it was sent to Weston-Mott.  | <b>R</b>                             | Two punch marks on either side of the round impression are the buyer's inspector's O. K., as well as the O. K. test for the toughness of the core. |
| <b>G</b> 20 S.                     | This means that the cutting is a 20 degree special tooth.   | <b>S</b>                             | Round impression indicates the Brinnell test for hardness.   |
| <b>H</b> 6 (inside of a diamond).  | This indicates that the blank was heat treated before machining.  | <b>T</b> 11.                         | Number of man who performed the second machining operation of turning the face and back angle surfaces.  |
| <b>I</b> 7.                        | Number of men who O. K.'d the blocking of the teeth.  | <b>U</b> C I. (inside of a diamond). | This indicates the chief inspector's O. K. on lots of 100.   |
| <b>J</b> A. (inside of a diamond). | This indicates that the gear blank was annealed before machining.   | <b>V</b> 2-15.                       | This indicates the month and year in which the gear was generated.   |
| <b>K</b> 655.                      | Time clock number of the man who performed the first operation in the machining department, consisting of boring out the center hole and facing the back. | <b>W</b> 255.                        | Number of man who drilled the gear.  |
| <b>L</b> K.                        | This indicates inspection of the holes.   | <b>X</b> 4-69-2.                     | This is the heat treating number and indicates the position in the pot, the location of the pot in the furnace, and the number of the furnace.     |

It is this close attention to details of production in the final analysis that has most to do with the unquestioned superiority of Brown-Lipe products. For the story we have told here is applicable in general throughout both of our plants in relation to the entire Brown-Lipe output.

## BROWN-LIPE-CHAPIN CO.

NEW YORK

DIFFERENTIALS

DETROIT

L. D. Bolton, 2215 Dime Savings Bk. Bldg.

SAN FRANCISCO

A. H. Coates, 444 Market St.

# \$985

Of the many advantages of the eight cylinder over any other type of motor, perhaps those which stand out most prominently are the smooth, gliding motion of the car when driving and the remarkable flexibility of the assembled product.

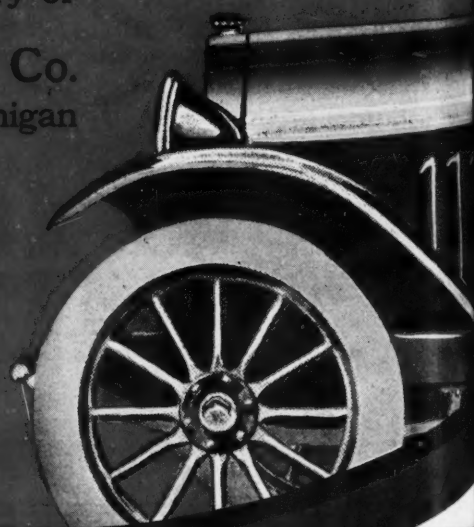
With no other type of motor are you able to derive the same smooth, even driving results, irrespective of road conditions.

In driving a "Hollier Eight" it is seldom necessary to change gears, whether crawling through crowded traffic, ploughing through the heaviest sand, or speeding up the steepest hill. There is that continuous, even flow of power on all roads and at all speeds which provides you with flexibility beyond anything of which you have ever dreamed—with no apparent effort on the part of car or driver.

The "Hollier Eight" is particularly remarkable for its flexibility, its silent action, its freedom from vibration, its ease of control, its accessibility, its ability for continuous running on high gear, its reserve power, and its economy of maintenance.

It is made complete in the factory of

**The Lewis Spring & Axle Co.**  
Jackson Michigan





# HOLLIER

\$985 EIGHT \$985

## YOUR ASSURANCE *of a* PRODUCT WELL MADE

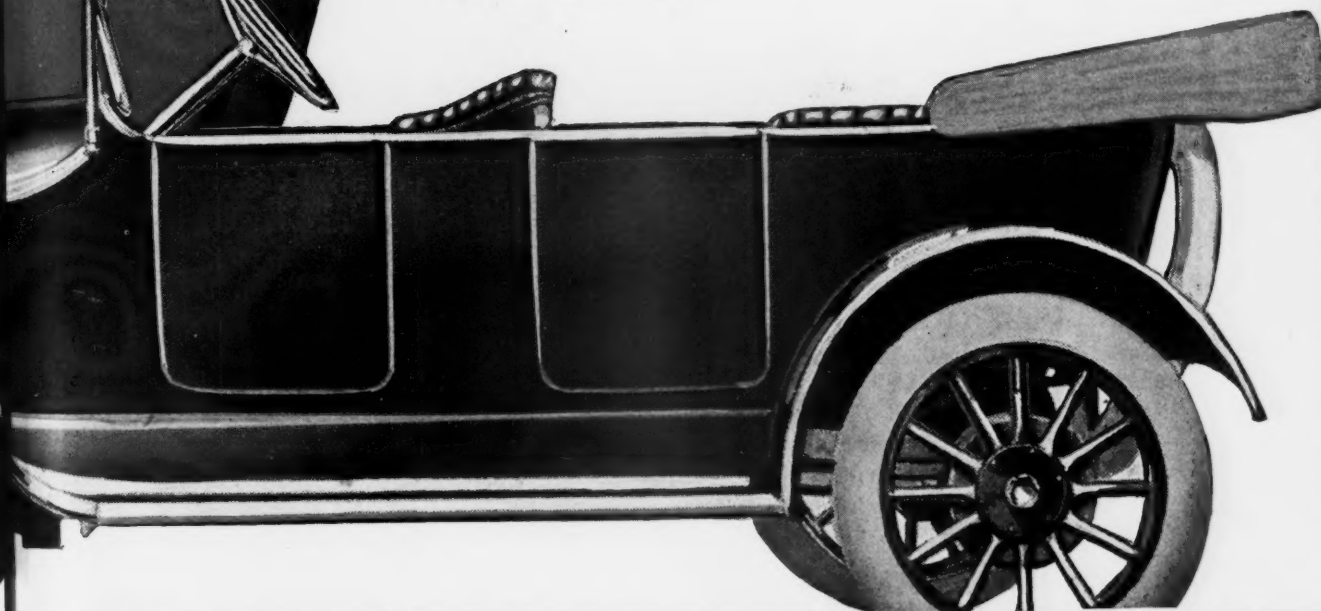
For more than 15 years the manufacturers of the Hollier Eight have specialized in the production of high quality vital motor parts—such parts as motors, springs, axles, transmissions, etc.

The wonderful manufacturing experience of these fifteen years, together with the remarkably efficient engineering corps we have drawn together, have most to do with our ability to produce such a car as the Hollier Eight at such a price.

You get in the Hollier Eight full benefit of years of costly experimentation and development, but you don't have to pay for it.

Nor have we drawn upon our past experiences only to the extent of proper designing and manufacturing, for in the determination of parts and raw materials to be used, again, we have been able to profit greatly from our practical experiences.

So rest assured that back of the Hollier Eight stands an organization that has solved the most intricate motor car problems year after year, and solved them creditably—an organization that is able and determined to revolutionize the manufacturing of eight-cylinder motor cars.



## HARD HEADED BUSINESS MEN KNOW HOW TO BUY

In the commercial field, where nothing counts like service value,  
the use of

TRADE MARK  
**Raybestos**  
REG. U.S. PAT. OFF.

as original and replacement brake lining equipment is practically universal.

Here is a field in which conditions ordinarily place a burden on the brake lining far in excess of any burden it might be called upon to sustain in pleasure car usage.

Here, then, is conclusive proof of the quality of RAYBESTOS, for in their business affairs, men weigh the relation between price and service more carefully than in their private affairs, and they check up their judgment by results.

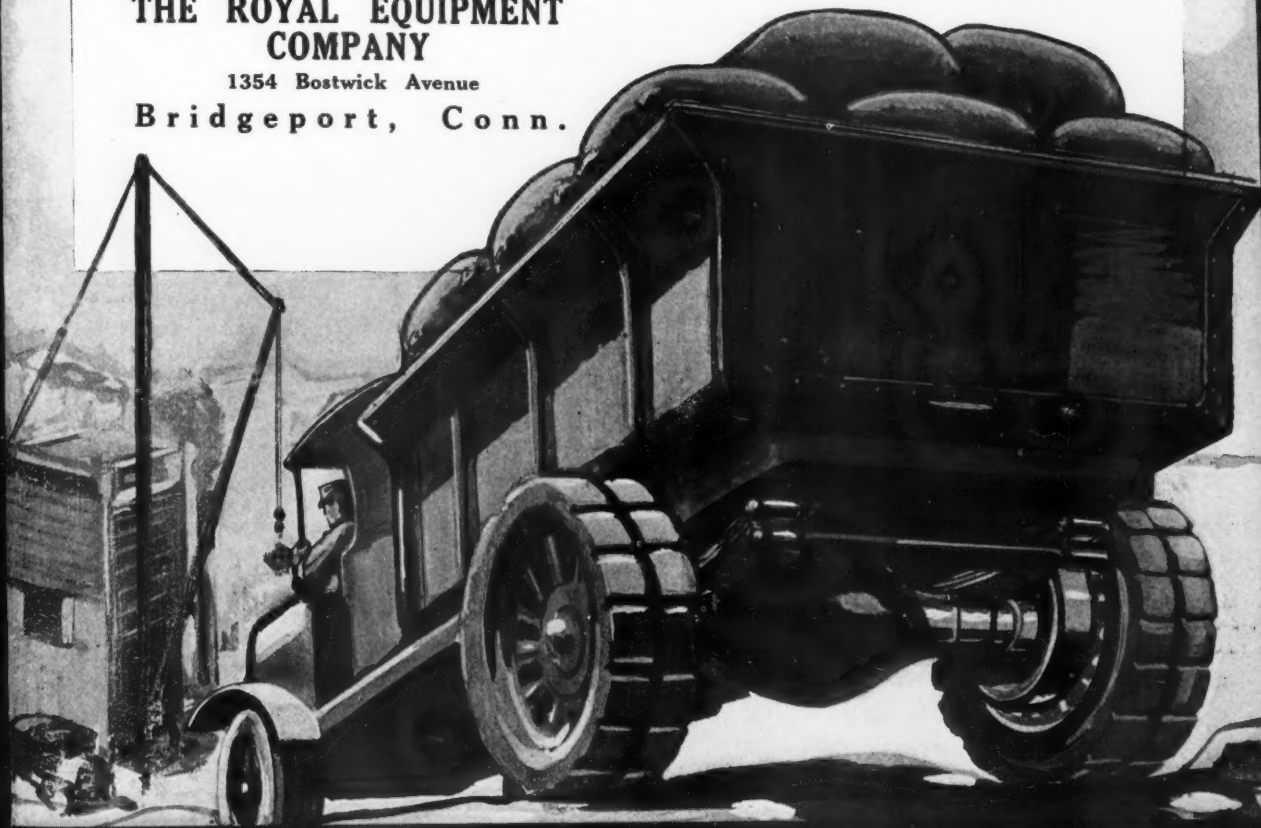
Because its service outweighs any difference in price, RAYBESTOS dominates the commercial field almost absolutely.

RAYBESTOS is distributed by wholesale jobbers in every large city and is sold by the trade everywhere.

### THE ROYAL EQUIPMENT COMPANY

1354 Bostwick Avenue

Bridgeport, Conn.



When Writing to Advertisers, Please Mention Motor Age



# BOSCH for FORDS

## A Necessity—Not a Luxury

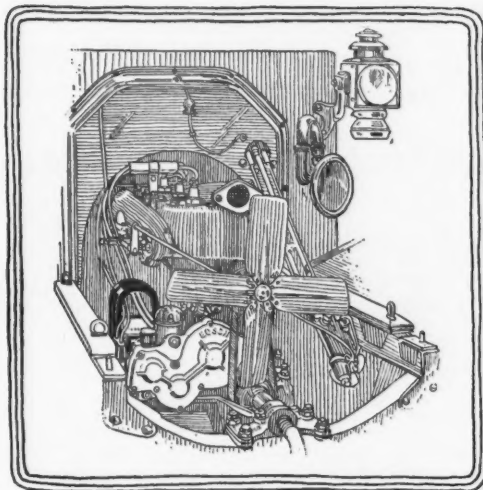
A SIMPLE SYSTEM  
OF IGNITION

ONLY FOUR SHORT  
CABLES

A DROP OF OIL  
EVERY 1000 MILES  
THE ONLY ATTEN-  
TION

THOROUGHLY  
RELIABLE

EXTRAORDINARILY  
EFFICIENT



ELIMINATES THE  
SPARK NUISANCE

ELIMINATES BOIL-  
ING OF RADIATOR

ELIMINATES  
PUZZLING IGNITION  
TROUBLES

ELIMINATES  
VIBRATION FROM  
MISFIRING

ELIMINATES THE  
ONE BIG WORRY OF  
THE FORD CAR

The Bosch-Ford Attachment Installed

**M**OST Ford accessories now being offered to Ford owners are luxuries—something added for looks or extra comfort; that's why the average Ford owner isn't sold.

The Bosch-Ford Attachment is a **NECESSITY** for Fords—not a luxury. It is an accessory that becomes the most important part of the car; it is a necessity because it gets out of the car the life that is built into the car—life, in the form of efficient service and without repair and replacement bills. It is an ignition system that employs the simple but efficient Bosch Magneto of world-wide fame.

The Bosch-Ford Attachment provides efficient and reliable ignition. The weak, irregular spark is no more. In its place occurs a big, fat, arc-like spark that not only gets every ounce of power out of the fuel but does so without straining the engine or car. Unlike other ignition systems, the Bosch Magneto creates its sparks so that each cylinder works in absolute time with every other—there are no uneven power strokes—there is no wear or tear, there is no more boiling of the radiator.

You can have the same ignition system that was used by the winners of the 1915 Vanderbilt Cup and Grand Prize Races, if you fit a Bosch-Ford Attachment. Remember it's a Necessity—Not a Luxury.

—Write to-day for "The Key to Ford Efficiency"—

**BOSCH MAGNETO COMPANY, 214 W. 46th Street, New York**

Service and Distributing Stations in Every State



Recommended to you by  
five years actual service

## Dorris Commercial Cars

The perfected valve-in-head motor

### Dorris advantages

The Dorris 1500-lb. Delivery Wagon Chassis, price \$1900, is especially adapted for high grade delivery work, ambulance and hearse service.

Unit power plant, 45 H. P. brake test, all working parts easily accessible, Stromberg Carburetor, Full Floating Timken Rear Axle, Timken Roller Bearings, Three Speeds and Seamless Tank are some of the Dorris Commercial Car advantages.



Wheelbase 132 or 144 inch,  
optional, Chassis price,  
\$1900

## TWO-TON TRUCK=1500-LB. WAGON

### Worm drive

The Dorris Two-Ton Truck, price \$2500, sturdy, strong and durable —built for hauling all classes of merchandise.

*"Pulls any load on any road"*

### Write for Exclusive Agency

Dorris Pleasure and Commercial Cars are built in the Dorris factory—and are guaranteed under the standard warranty officially adopted by the National Association of Automobile Manufacturers.

The complete Dorris line insures a profitable all year 'round business—write today for Special Territory Offer to Dealers.



Wheelbase 144 or 162 inch,  
optional, Chassis price, \$2500

**Dorris Motor Car Co.,** 4104 Laclede Ave., **St. Louis, Mo.**

*Designers and Builders of Dorris Pleasure Cars and Motor Trucks*

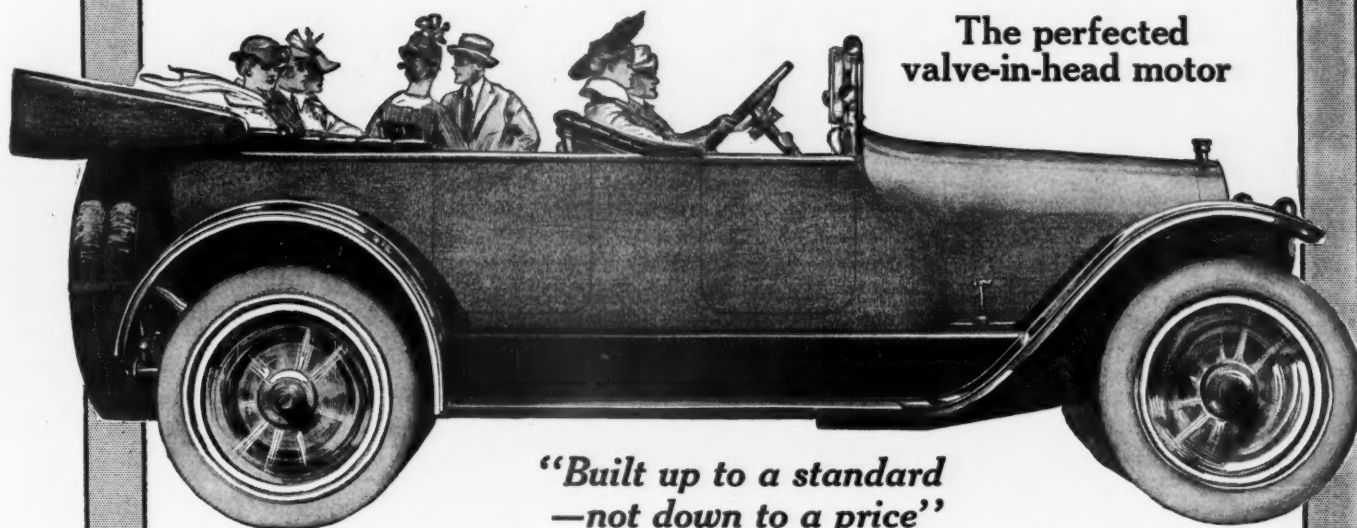




You can pay a higher price—but  
you can't get a better performer

## Dorris Six Cylinder

The perfected  
valve-in-head motor



*"Built up to a standard  
—not down to a price"*

### Backed by ten successful seasons

#### *Equal to any emergency*

The famous Dorris valve-in-head motor, with its seven bearing crank shaft and seven bearing cam shaft—small wall area of combustion chamber—uninterrupted flow of gas—a greater flexibility than it is possible to attain in any other type of motor—insures less loss of heat, less fuel waste, therefore more power, more miles per gallon of gasoline.

The Dorris "Six" will take railroad crossings, rough, uneven roads at full speed without jolting—due to a combination of a 42-inch front spring with a set of platform springs—the side spring being 50 inches, the cross spring 40 inches, equalling 224 inches of spring length to the car—insuring a long, easy swing, no sidesway and holding the road at any speed.

#### *Demonstration means a sale*

When you investigate the Dorris, the more you know about motor cars the better we'll like it. The first time you sit at the wheel of the Dorris "Six" and experience its ample power, extreme flexibility, absence of vibration under all conditions, the even, steady pull, noiseless action, you will agree that here is a "Six" that will sell to your trade—a money maker for you.

Quality throughout—no detail of upholstery, comfort room or finish has been stinted, or overlooked. The Dorris "Six" represents exceptional motor car value for the buyer who appreciates the best of everything. It is electric started, ignited and lighted, seven-passenger, 128-inch wheelbase, price \$2475.

Write today for advance folder and exclusive territory offer.

**Dorris Motor Car Co.,** 4104 Laclede Ave., **St. Louis, Mo.**

*Designers and Builders of Dorris Pleasure Cars and Motor Trucks*



# Champion

TOLEDO MADE FOR THE WHOLE WORLD'S TRADE

## Why We Share Profits With Our Dealers

Largely because Dealers have so intelligently recommended them, the super excellence of Champion Spark Plugs is universally recognized today.

In recommending Champions when replacements are required, Dealers have wisely followed the judgment of the Ford — Overland — Studebaker — Maxwell — Metz Engineers and the experts of over sixty other Factories.

The experts are so nearly unanimous that over 80 % of all American-made automobiles are originally equipped with Champions by their builders.

The consequence of all this expert recommendation by Engineers and Dealers is tremendous quantity production in our Factory (averaging 25,000 plugs per day), resulting economies and greater profits.

Dealers are entitled to a share of these profits which their steadfastness helps to create.

And in order that their share may be as large as possible, we continually tell the world about Champion Super Excellence in our advertising in the Saturday Evening Post, Literary Digest, Christian Herald, Popular Mechanics, the fourteen leading agricultural periodicals, etc., etc.

If our 1915 Profit Sharing Contract is not already in your strong box, it is ready for you, Mr. Dealer. Ask your Jobber's Salesman about it or write to us about it today.

**Champion Spark Plug Co.**  
1504 Upton Ave., Toledo, Ohio

**Champion**  
TOLEDO MADE FOR THE WHOLE WORLD'S TRADE

Conical  
 $\frac{7}{8}$ -18  
Long  
Price  
**\$1.00**

Specially Designed to develop Maximum power in Buick Motors. Has extension base, conical porcelain, Buick terminal.

**Champion**  
TOLEDO MADE FOR THE WHOLE WORLD'S TRADE

**X**  
Special  
 $\frac{1}{2}$  inch  
Price  
**75c**

Factory Equipment on Ford Cars since 1911

**Champion**  
TOLEDO MADE FOR THE WHOLE WORLD'S TRADE

Two-Piece  
Heavy  
Stone  
All Sizes  
Price  
**\$1.25**

For High Powered automobiles, trucks and Stationary Engines





## An Effective Spark at all Speeds Insures Motor Efficiency at all Times

The quality of a spark at any speed depends upon how thoroughly the ignition system can saturate its coil at that speed. This is a truth capable of exact proof.

Saturating a coil is accomplished by causing current to flow through it, and the longer it is allowed to do so the more thoroughly the coil becomes saturated. This also is a truth capable of exact proof.

Due to the protection afforded by the Automatic Switch, CONNECTICUT AUTOMATIC IGNITION is enabled to keep its primary circuit closed for the longest possible time between each successive spark, thus insuring thorough saturation of its coil at all speeds.

It is the only ignition system which can do this, and as a result invariably shows a higher relative efficiency at every speed than any other system. This is a fact, the

truth of which can be established by dynamometer tests.

In the storage battery of the car's starting and lighting equipment CONNECTICUT AUTOMATIC IGNITION has a source of current that is ample, uniform and inexhaustible. Any ignition system, magneto or otherwise, which cannot effect thorough saturation throughout the whole range of speeds, cannot show the results CONNECTICUT AUTOMATIC IGNITION does.

**CONNECTICUT** TELEPHONE & ELECTRIC **COMPANY, Inc.**  
MERIDEN CONN.



## The Crest of Popularity

Once in every few years, some development of the motor car industry places some car on the highest crest of popularity.

Today, it is generally admitted, the Regal line occupies this position. Not only does the line contain three models, which practically supply every motor need, but they are priced so favorably that it taxes even our ten acre factory to the utmost to keep up with the demand.

From your standpoint, as a dealer, there never was a more opportune time to secure a desirable connection to attach yourself to a success, and share in the profits of business done in a big way.

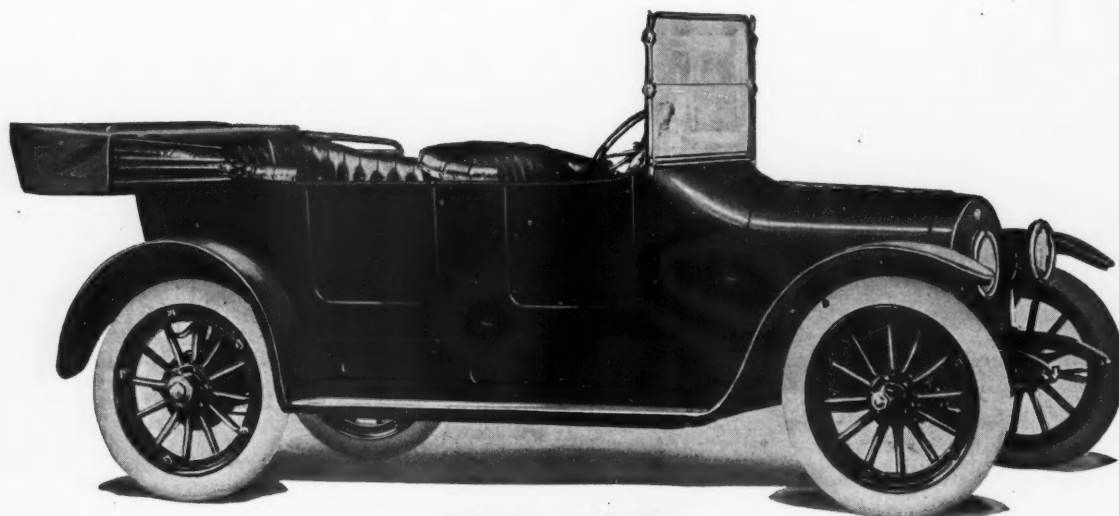
Keen dealers are grabbing every square inch of open territory.

These are the cars:

|  |        |
|--|--------|
| A Light "Four" (106 inch wheelbase)..... | \$ 650 |
| A Standard "Four".....                   | 1085   |
| A De Luxe "Eight".....                   | 1250   |

## Regal Motor Car Company

401 Piquette Avenue, Detroit, Michigan



Light "Four" \$650



## Most Astounding Feat of Its Kind Ever Performed!

Sixty-seven starts from complete stops on high gear without killing the engine once—67 starts on high in the great congested Chicago loop—where wonderful flexibility was absolutely essential.

That's the astonishing result of a test made with the new Stromberg Carburetor on a seven-passenger Marmon 41 April 9th, under the direction of the Chicago Automobile Club's Technical Committee.

The big car, with five passengers, covered 10½ miles—traveled most of the distance at a speed of less than 2½ miles per hour—started 67 times—all on exactly 1 1/3 gallons of gasoline.

But that's not all! Without disturbing the sealed gears—without re-adjusting the new Stromberg Carburetor—the Marmon took a 10½ mile no-stop spin on a rough, deserted road—and came home with a record of 15¾ miles per gallon of gas.

### What Vital Fact Does This Prove?

It proves the remarkable flexibility—the smoothness—the perfection—the wonderful economy of the new Stromberg Carburetor—proves that the Stromberg has taken the final forward step in Carburetor perfection—that this new model, the greatest master stroke in Carburetors, offers every car owner maximum power—speed—economy.

Let us show you how the new Stromberg will bring your car up to perfection—add new power—new speed—greater economy.

Send us the name, make and model of your car—get free inside information on Carburetors for your particular machine.

# 67 Starts on High!

## From Dead Stops



# New STROMBERG Did it!

MOTOR DEVICES COMPANY

64 E. 25th STREET, CHICAGO

When Writing to Advertisers, Please Mention Motor Age

# The CHALMERS

is another of the many distinguished good cars equipped with tops of genuine

# Pantasote



Makers of the best cars recognize that there is no true substitute for the service which a Pantasote Top provides—from the standpoint of perfect shelter, absolute weatherproofing, lasting wear under all conditions of weather and extreme temperature and climate.

A Pantasote Top is lastingly handsome. The manufacturer who equips with genuine Pantasote Tops is giving *plus* service to the purchasers of his cars—*more value* for their money.

He is giving *plus* service to his dealers and agents by providing *one more* important and well known selling feature to help reduce their selling cost.

Top material that absorbs and holds dust, dirt or grease stains, stretches out of shape and wears away where folded—does *kill* the appearance of the handsomest car that ever went onto the road. And *has killed* many a repeat order.

A genuine Pantasote Top is the manufacturer's principal insurance to dealer and owner against the slovenly appearance of every car that goes out of his factory—today and in a year—and for a period far outlasting any other top material.

**The Pantasote Company, 1705 Bowling Green Bldg., New York City**



# HOT *of the* PRESS to YOU the NEW F & S CATALOG

IN THIS DISTINCTIVE CARRIER



—yours for the asking



Fifty-four pages of Ball Thrust sizes and tables, both single and double direction, and Locating Washers. Twenty-one types embracing twenty-five sizes, illustrated and tabulated.

The various tables give the maximum safe loads in pounds at R.P.M., the inside and outside dimensions, radius, height, thickness and number and size of balls of each bearing.

Four pages of Conversion Tables giving millimeter equivalents,  $\frac{1}{16}$  to  $1\frac{1}{2}$  inches, and decimal equivalents of fractional inches,  $\frac{1}{16}$  to 1 inch, and millimeters to decimal inches, 1 to 400 mm.

All printed on fine 90 lb coated Puritan stock, 6x9 inches in size, indexed, and strongly bound in stiff brown covers, with separate price-list on canary bond paper.

All the illustrations reproduced from wood cuts; the whole compendium making the most complete Ball Thrust Catalogue ever produced, handy for reference. You may need it some day.

# It leads all Ford Starters

The lead of the Genemotor over the 20 other Ford starters *increases* each day.

More and more *orders* are coming in. More and more *shipments* are going out.

New dealers are *joining* the Genemotor legion. Old dealers are wiring to *increase* their allotments.

Yet there will be enough Genemotors for all.

For there is one single building in the great Lynn Works of the General Electric Company big enough to supply Genemotors for all the Ford cars in America.

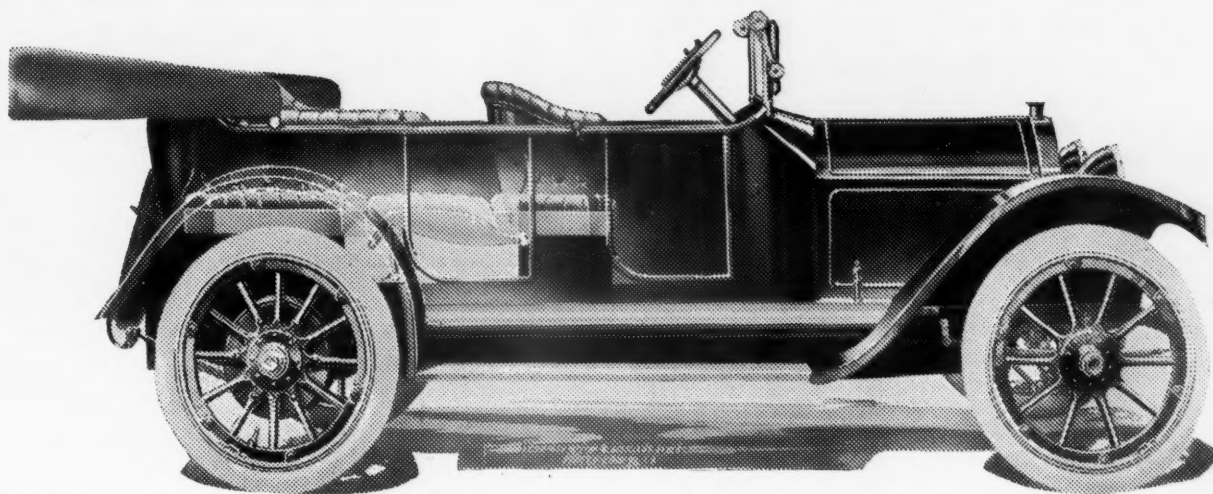
A. J. PICARD & CO., *Sole Agents*

1720-22 Broadway, New York

# Genemotor

(Trade Mark)

# SPAULDING



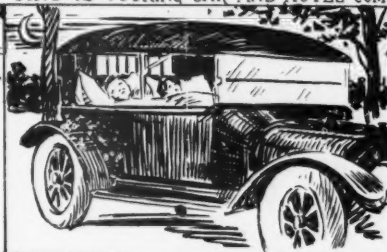
## “See America First” in a Spaulding Sleeping Car

**The ONLY SLEEPING CAR AUTOMOBILE MADE**

It BEATS TRAVELING HALF THE NIGHT TO GET TO A HOTEL.

IT MAKES UP LIKE A PULLMAN AND IS TOURING CAR AND HOTEL COMBINED.

IT SOLVES THE MOST DISAGREEABLE QUESTION OF TOURING — THE HOTEL.



**Good Territory Open for Agents**

*Write or Wire*

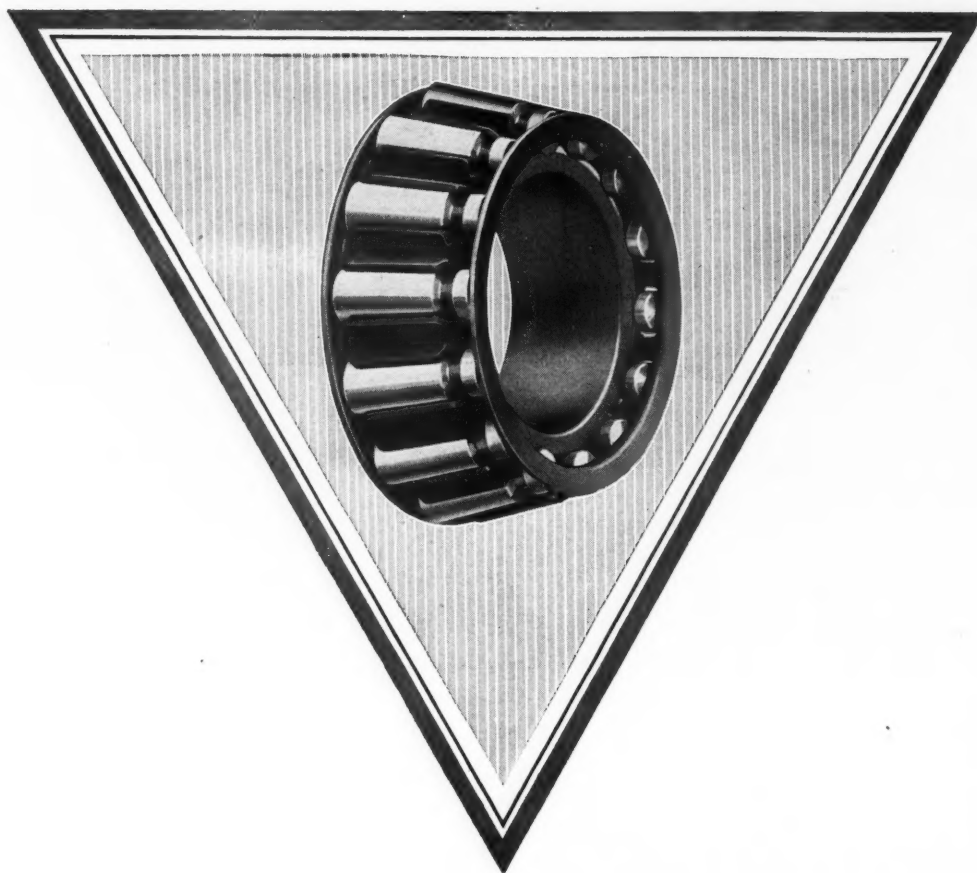
**SPAULDING MFG. CO.,**

**Grinnell, Iowa**



# TIMKEN

## ROLLER BEARINGS



## One Timken Bearing One Timken Quality

**I**N material, in design and in workmanship, Timken Bearings are all alike. There is only one quality. That is Timken quality. There is only one grade—the very best the Timken Roller Bearing Company knows how to make.

Although there are over two hundred sizes, designed to take care of different amounts of end-thrust and radial load, yet the same special analysis steels, the same heat-treatment, the same principles of design, the same machining, grinding

and gauging operations, the same uncompromising inspections enter into the manufacture of each individual bearing.

Whatever the policy of other bearing makers, it always has been and will remain Timken Policy to make every Timken Roller Bearing, large and small, one Timken Quality through and through.

The story of anti-friction bearings, their care and importance is told in an interesting way in the Timken Primer T-4 "On Bearings." This and a list of cars using Timken Bearings will be mailed to you free on request.



**Timken Roller Bearing Company**  
Canton, Ohio



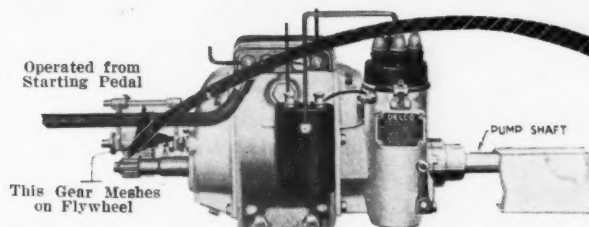
*When Writing to Advertisers, Please Mention Motor Age*

# DELCO

**ELECTRIC  
CRANKING**



**LIGHTING  
IGNITION**



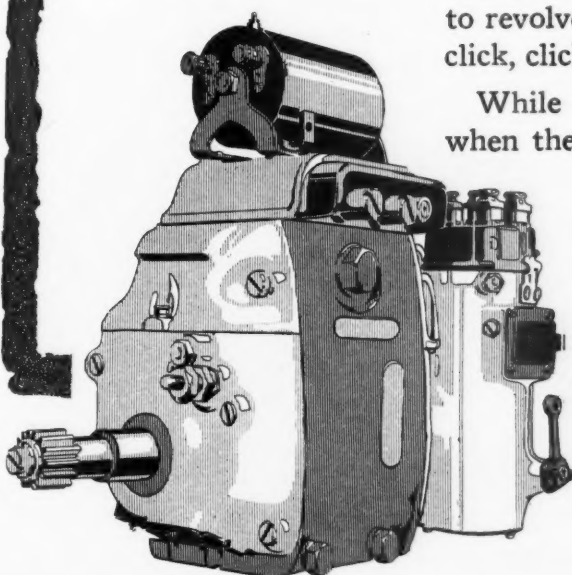
## Protects Your Battery

**A**MPLE warning is provided in the Delco System to prevent your leaving the battery switch closed when the car is idle.

It is obvious that if a driver were to leave his battery circuit closed by not turning off the switch when the car was standing still, it would discharge the current in the battery and if allowed to stand long enough, would automatically result in entirely discharging the battery.

To obviate any possibility of this condition taking place, the over-running clutch which is used in the original starting of the gas engine is so constructed that when the car is brought to a standstill, unless the battery be cut out, this clutch will continue to revolve with a very audible and continuous click, click, click.

While there is no sound from this clutch when the car is in motion, immediately upon the stopping of the car, this click begins, thus calling the attention of the driver to the necessity of pushing in his switch.



**The Dayton Engineering  
Laboratories Co.  
Dayton, Ohio**



To permit, without the use of tools, the removal of the magneto simply by lifting it straight up—and to compensate for any deviation in the driving line of the driving and driven members of the magneto, the Eisemann flexible, adjustable Magneto coupling has just been placed on the market.

This coupling which may be used with any standard magneto, is dust, dirt and practically wear proof. It admits of an adjustment to the timing over a range of 40 degrees (plus or minus 20 degrees) without dismounting either the magneto or the coupling. It also cushions the driving power.

The retail price of the Eisemann Magneto coupling is \$3.25. Ask your dealer or send to us direct.

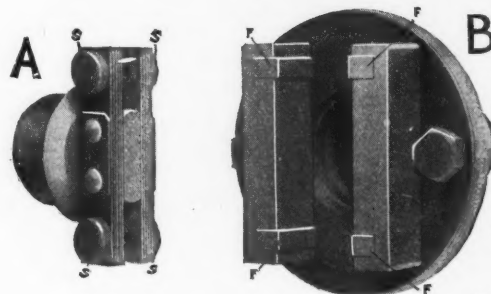
### Eisemann Adjustable Magneto Coupling



#### The Eisemann Magneto Co.

Sales and General Offices  
32-33d St., Brooklyn, N. Y.

New York      Indianapolis, Ind.      Detroit, Mich.  
245 W. 55th St.    415-417 N. Capitol Ave.    802 Woodward Ave.



The driving member A is attached to the Magneto driving shaft. Driven member B is attached to the magneto armature shaft. A is free to move within B to compensate for misalignment in one direction, while the flexible laminated steel springs in driving member A compensate for any misalignment in the other direction, the contact being between fiber plugs F and round metal buttons S.



# Continental World-Wide Prestige

"A name is one of the few things which cannot be bought." Prestige is won only by long achievement.

Continental motors owe their predominance to the searching test of time. Fifty thousand Continentals are specified for 1915 because thrice fifty thousand have been giving unprecedented service during twelve years past.



## ***Continental Motors***

In 1902 the earliest Continental models were designed. European practice, for the first time, was brought into domestic use. These models, combining the merits of two schools of engineering, created a new type.

Today that type is dominant in American manufacture.

Today, 128 builders of pleasure cars and trucks rely on Continental **manufacturing** prestige with absolute assurance. Over ten thousand dealers find Continental **sales** prestige the prime asset of their establishments.

Prestige—it is an enduring title, not here today and gone tomorrow. Prestige, not price, sells Continental Motors.

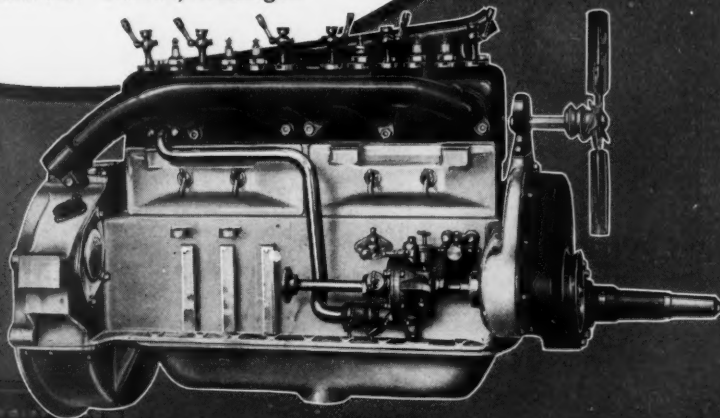
A motor with prestige is a certainty. Insist on a Continental.

**Continental Motor Mfg. Co.**

DETROIT, MICHIGAN

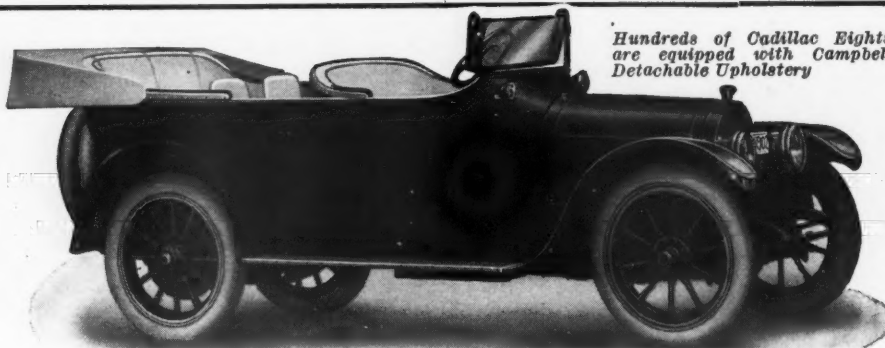
*Largest exclusive motor builders in the world*

Factories: Detroit, Muskegon





"Look for  
the name  
Campbell  
on the  
buttons"



Hundreds of Cadillac Eights  
are equipped with Campbell  
Detachable Upholstery



"Look for  
the name  
Campbell  
on the  
buttons"

## Get the Business This Spring With Campbell Detachable Upholstery

Take the lead with the Campbell product that is better than seat covers. Sell Detachable Upholstery, the kind that fits like a custom-tailored suit and holds its fit.

See the new spring patterns, the beautiful Motor Ducks, Cleanezys, Mohairs, and less expensive Jeans. Note the wide range of colors and weaves to suit the purse and taste of every car owner. And remember that Campbell Detachable Upholstery is the aristo-

crat of Motordom in fit, finish, and wearing qualities. Reduced prices for 1915.

Hundreds of thousands of motorists join in recommending the Campbell product. Better investigate this today. Write us for our selling plan and Helps for Dealers. If you are interested in Ford cars, we have a special made seat cover at a ridiculously low price in addition to our Detachable Upholstery.

### CAMPBELL GUARANTEED MOTOR CAR ACCESSORIES



**This Fan Belt for  
Fords outlasts three  
ordinary belts.**

The most popular fan belt on the market. Made of Latigo Leather. Impervious to heat, water and oil. Will not stretch or run off the pulley. Write for prices and discounts.

#### Other Specialties for Fords

Campbell also makes foot accelerators, windshield ventilators, muffler cutouts, clutch throw-outs, crank boots, shock eliminators, and other accessories for Ford cars.



**Cleans tops, covers,  
upholstery, rugs.**

Percama is the magic word for all dirty heavy fabrics. Gets all the dirt, grease and oil without injuring the fabric or harming the water-proofing. Contains no explosive. Quart 25c.



**One - Man - One -  
Hand Top for  
Light Cars**

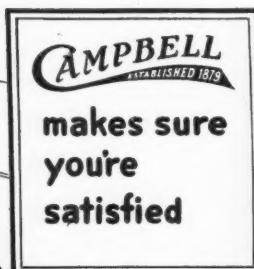
A high grade top that a child can operate. Finest mohair and leather used. Complete with dusthood and 10-Second or Jiffy Curtains.



**Write for this  
Catalog**

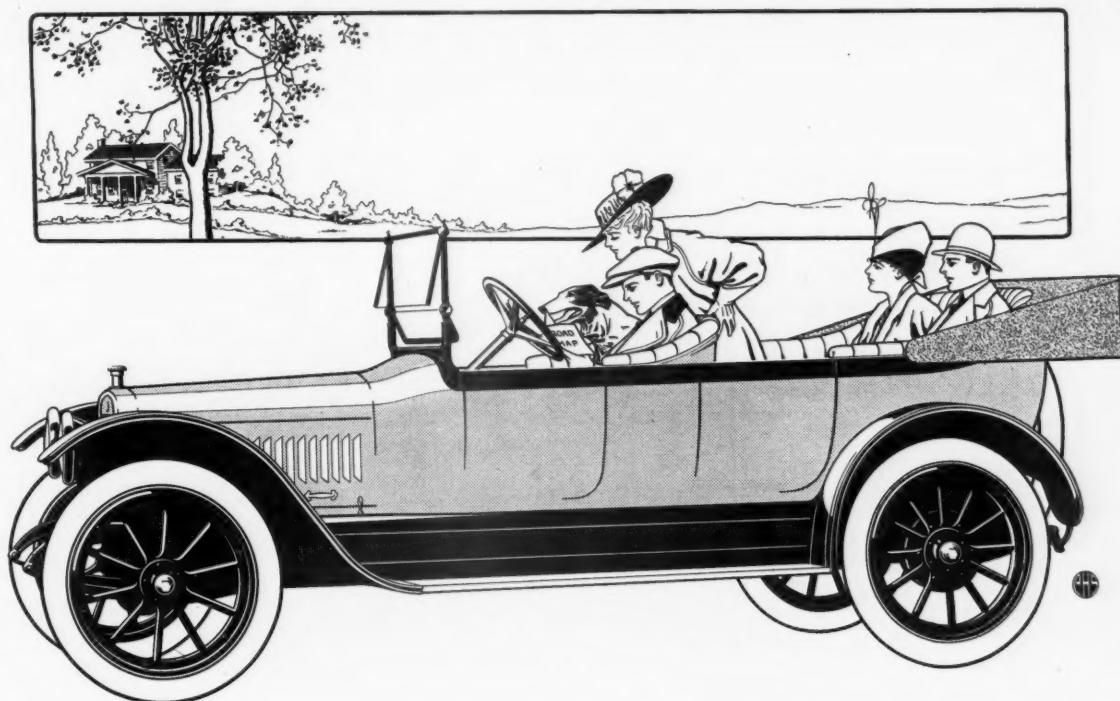
Contains descriptions of the full Campbell line and tells about the famous Campbell Guarantee. Special proposition to reliable dealers. Write today.

**The Perkins-Campbell Co.  
624 Bdw. Cincinnati, O.  
New York Office: 80 Chambers St.**



# WINTON SIX

## \$3500 in 25 Cash Prizes



To the chauffeurs who make the best service records in the Winton Six Repair Expense Contest of 1915, the Winton Company will pay cash prizes of \$3500.00, as follows:

|              |       |               |       |                |       |                  |       |                   |       |
|--------------|-------|---------------|-------|----------------|-------|------------------|-------|-------------------|-------|
| First .....  | \$500 | Fifth .....   | \$100 | Ninth .....    | \$100 | Thirteenth ..... | \$100 | Seventeenth ..... | \$100 |
| Second ..... | 400   | Sixth .....   | 100   | Tenth .....    | 100   | Fourteenth ..... | 100   | Eighteenth .....  | 100   |
| Third .....  | 300   | Seventh ..... | 100   | Eleventh ..... | 100   | Fifteenth .....  | 100   | Nineteenth .....  | 100   |
| Fourth ..... | 200   | Eighth .....  | 100   | Twelfth .....  | 100   | Sixteenth .....  | 100   | Twentieth .....   | 100   |

And Five District Prizes of \$100 Each

This will be the Eighth Annual Contest for Winton Six Chauffeurs. Somebody will win this money. Why not win a prize yourself?

Absolutely no entrance fee or other expense on the part of the chauffeur or his employer will be required.

Every employed driver of a Winton Six car, no matter what model, may compete for these money prizes.

If you do not drive a Winton Six you will not be entitled to compete.

But if you are a Winton Six driver, send us the name and address of your employer, and your own name and address, and we will supply you with report blanks before the contest starts on May 1st. Write to

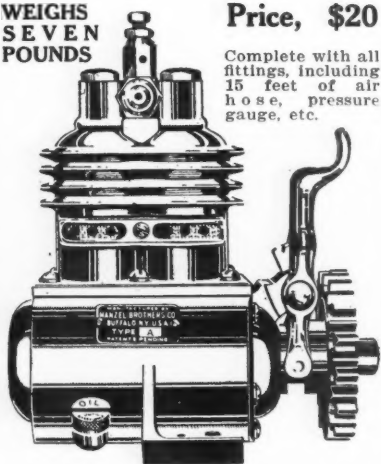
**The Winton Motor Car Co.**  
424 Berea Road, Cleveland, Ohio, U. S. A.

*The owner of the Model 21-A (\$2285) car making the best record in this contest will get a new 21-A car free in exchange for his old car*



## The Tire Pump with the Rugged Constitution

**WEIGHS  
SEVEN  
POUNDS**



**Price, \$20**

Complete with all fittings, including 15 feet of air hose, pressure gauge, etc.

**We carry in stock fittings  
for the following cars:**

Abbott-Detroit, Buick, Cadillac, Cartcar, Case, Chandler Six, Chalmers, Cole, Dodge, E.M.F., Enger, Franklin, Grant, Hudson, Imperial Six, Jeffery, KisselKar, Maxwell, Michigan, Mitchell, Moon, Oakland, Oldsmobile, Overland, Packard, Paige - Detroit, Rambler Cross Country, Reo, Simplex, Speedwell, Studebaker, Stutz, Velie, Westcott and others.

## Tell Your Dealer the make and model of your car when you order a

# MANZEL ENGINE-DRIVEN TIRE PUMP

**\$20** complete with all fittings,  
15 feet of hose pres-  
sure gauge, etc. **\$20**

He will give you a Manzel Pump complete with gears and bracket for your particular car, that will enable you to install it yourself. You can put it on in less than an hour—with a screwdriver, a file and a wrench—and once on it's on to stay. It will pump your tire to the proper pressure in a couple of minutes, without effort on your part, without damage to your engine.

Owing to the two-cylinder principle of its construction it will deliver a continuous and uniform supply of air to your tires—the last 20 pounds the same as the first 20 pounds. No jump, jerk or pound—no backlash, with its resulting damage to gears and magneto timing—damage inseparable from single-cylinder pumping devices. All for \$20—less than the price of a new shoe, and it will save its cost in tire repairs in a season's driving.

**The Manzel Pump for FORDS is a business-  
like accessory at a FORD price**

Like its bigger brother, it is a splendidly made engine-driven pump that admirably fulfills its purpose. It's a pump of substantial service—not a gim-crack; and its price is

**\$7.50** complete with gauge,  
gears and 12 feet  
of air hose **\$7.50**

## MANZEL BROS. CO.

Factory and General Sales Offices: **306 Babcock St., Buffalo, N. Y.**

New York Office, San Francisco Office,  
U. S. Rubber Bldg., Broadway & 58th St. 356 Market St.  
Portland, Oregon, Office, 213 Gerlinger Building

Leaders, for 16 years, in the manufacture of quality  
oil pumps for heavy duty steam and gas engines

**DISTRIBUTORS IN ALL IMPORTANT CENTERS**

# You carry a 'Spare' Tire— why not a 'Spare' Spring?

The Spring with the center bolt usually breaks in the middle. A Tuthill Titanic has no center bolt and is guaranteed for life against center breakage.

And when a tire "blows" it's much easier to get another one than it is to get a spring even if you do not carry a spare tire.

When a spring breaks, however, you are right up against it—perhaps miles from a garage or repair shop—so why not carry a Spare Front Spring—and if it's an Unbreakable Titanic, your troubles are over.

In addition, we can furnish promptly the Tuthill Titanic with the famous DANN INSERT—the Interleaf Shock Absorber.

## Accidents avoided

There are a number of accidents each season caused by broken springs. The car is ditched and the occupants scattered over the landscape. If this happens to you, then you will pay more attention to the quality of the springs under your car. But why wait? A Tuthill Titanic Unbreakable is your best safeguard against a possibly fatal accident of this kind.



Guaranteed forever against  
center breakage

### DISTRIBUTORS:

|                    |                                      |
|--------------------|--------------------------------------|
| Albany.....        | Albany Hardware & Iron Co.           |
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| Baltimore.....     | Baltimore Hub, Wheel & Mfg. Co.      |
| Boston.....        | Post & Lester Co.                    |
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| Cincinnati.....    | Ohio Rubber Co.                      |
| Columbus.....      | Griswold-Sohl Co.                    |
| Dallas.....        | Fisk Co. of Texas                    |
| Davenport.....     | Sieg Iron Company                    |
| Dayton.....        | S. T. & G. A. Gebhart                |
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| Indianapolis.....  | W. J. Holiday Co.                    |
| Kansas City.....   | Faeth Iron Store Co.                 |
| Lincoln.....       | Nebraska-Bulek Auto Co.              |
| Los Angeles.....   | Chanslor & Lyon Co.                  |
| Milwaukee.....     | Babcock Auto Spring Co.              |
| Minneapolis.....   | Western Motor Supply Co.             |
| Oakland.....       | Chanslor & Lyon Co.                  |
| Peoria.....        | The National Elec. & Auto Supply Co. |
| Philadelphia.....  | Manufacturers Supply Co.             |
| Portland.....      | Chanslor & Lyon Co.                  |
| Rochester.....     | Sidney B. Roby & Co.                 |
| San Antonio.....   | The Fisk Co. of Texas                |
| San Francisco..... | Chanslor & Lyon Co.                  |
| Seattle.....       | Chanslor & Lyon Co.                  |
| Sioux Falls.....   | The H. F. Brownell Co.               |
| Tampa.....         | The American Supply Co.              |
| Toledo.....        | Union Supply Co.                     |

## Insist on Titanics

Specify Tuthill Titanic for your new car—insist on them when you break a spring—they cost no more and are the safest—so why invite trouble by riding on the ordinary kind.

No matter what make or model, your repair or garage man has a Tuthill Titanic for every car—either in stock or he can get it from us or our distributors on very short notice.

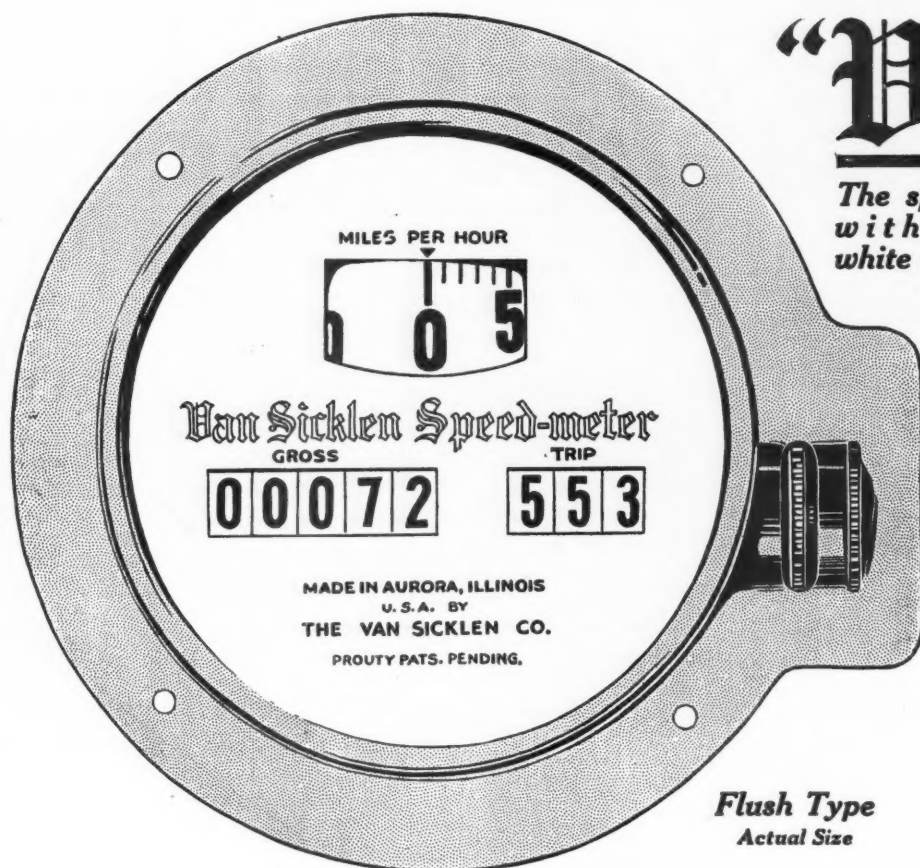
## TUTHILL SPRING COMPANY

772 POLK ST., CHICAGO, ILL., U. S. A.



*Tuthill Titanics are guaranteed  
absolutely against center breakage*

*Tuthill "Titanics" can be easily adapted  
to any axle construction and quickly  
mounted without extra expense.*



# "Van"

*The speed-meter  
with the big  
white face . .*

*Flush Type  
Actual Size*

For four years our engineering design has proved to be faultless. As knowledge of construction advanced, a corresponding improvement has been made in material used wherever it was possible to strengthen any part. The result has been practically a "No Trouble" car to owners.—Pilot Car Sales Co.

**PILOT—"The Car Ahead"—**  
in the practice of its doctrine  
of progressiveness, chose Van  
for standard equipment. Van's  
slogan is "No Trouble", too.  
Van never breaks with his  
friends.

**THE VAN SICKLEN COMPANY**  
AURORA ILLINOIS

Factory Representatives: Cutting, Armstrong & Smith Sales Co., Detroit, Mich.

General Distributors: The Beckley-Ralston Company, Chicago



# What's the Answer to the Mileage Question?



## But They Can't Answer Your Mileage Question Unless They're On Your Car

SOME men try to answer this question by buying tires at a price. How can they get mileage out of a tire that price prohibits the builder putting into it? Others endeavor to answer it by dickering for adjustments—and that is all they get. Others accept the factory equipment tires on their cars as the solution to the mileage question. But the car builder neither makes nor guarantees tires.

*This mileage question is never settled until it is answered right. You can only get as many miles out of a tire as the manufacturer puts into it.*

### Miller Builds Mileage In For You

by first making a shock-resisting back bone of cotton fabric. And do you know that fabric is just as important as rubber in a tire? In fact, while rubber is necessary for resiliency, its greater function is to protect the fabric. The Miller method, which gives you the right rubber compound (and plenty of it) goes farther. It produces the right kind of fabric and that's what makes Miller Tires go farther!

*The Miller Method is an exclusive process of vulcanizing with a low degree of heat—applied for a short time. It retains the natural wax and oil in the cotton fibre, and thus prevents internal friction, because it leaves nature's lubricant in the minute strands and fibre of the cotton.*

This wax and oil carbonize at 240 degrees, but the old method requires 287 degrees to vulcanize the tire. A brittle and lifeless fabric cannot stand the terrific punishment that all tires must endure.

The process by which Miller tires are built, thoroughly vulcanizes, makes a perfect unit of rubber and fabric, without burning the life out of either, and with no point of cleavage in the construction.

This method of vulcanization—the retention of the vegetable wax and oil—means life in the fabric and rubber. It results in safety—freedom from blow-outs, and additional miles of wear in Miller tires, as thousands and thousands of motorists have found out.

Settle this mileage question today by going to the Miller dealer. When he puts Miller tires on your car, you can put the mileage question out of your mind for good.

The answer to the skid question is Miller Geared-to-the-road Tires! They gear your car to the road through mud, sand or slush. With Miller tires on your car you're in control. Its tread is an integral part of the tire and retains its safety features until the entire tire is worn out. The greater mileage you get from them will make your choice of Miller Tires an economy, as well as a permanent safeguard.

**MILLER TUBES**  
answer the tube question.

**WAX AND OIL  
IN THE COTTON  
MEAN MILES  
ON THE ROAD**

**The Miller Rubber Company, Akron, U. S. A.**

*Distributors in  
Principal Cities*







## It's not a "Knock-out"—it's a Stampede

It's been a Stampede to the Stewart Warning Signal from the minute this high-grade, hand-operated Warning Signal was offered at \$5, our first and only price.

Since the stampede started other Signal manufacturers have been making desperate attempts to get a part of the business.

They have cut prices time after time—\$10, then \$7, then \$6, then \$5. They are now offering something at \$4, not yet on the market, the efficiency of which is unknown to the public. They are apparently begging and pleading with the public and the trade for business on any basis.

30,000 Stewart Warning Signals were sold in the month of March; 50,000 will be sold during the month of April and nearly 75,000 are on order for May.

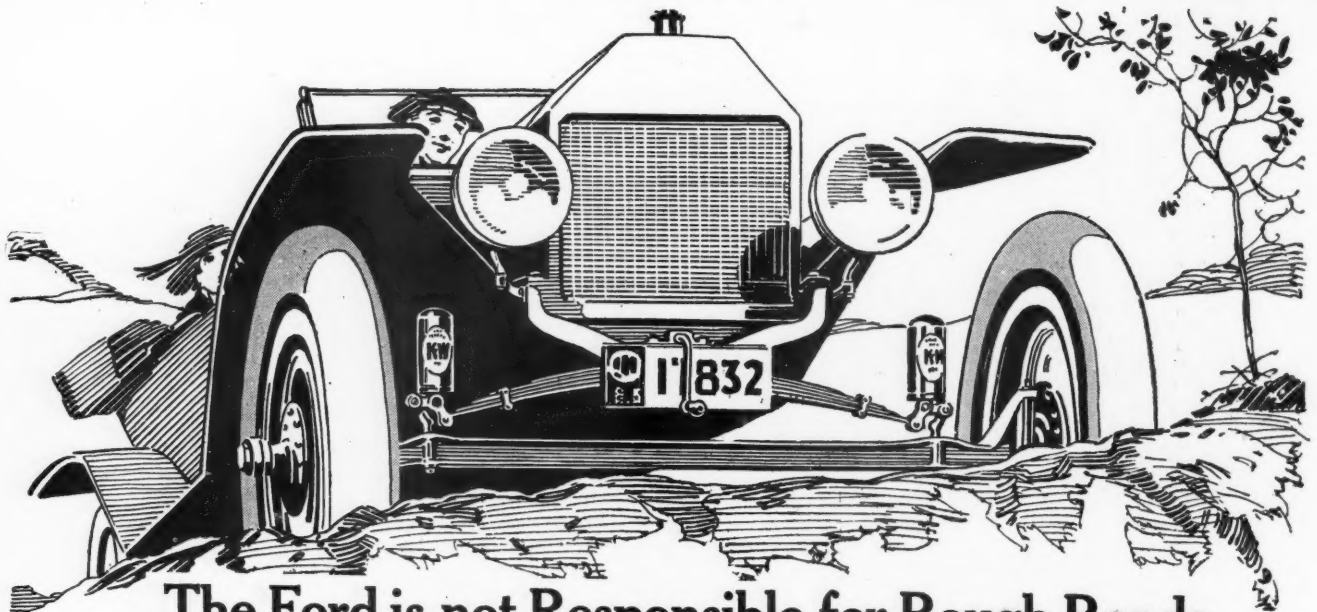
The public don't seem to want other signals. They know what the Stewart Warning Signal is.

A \$2 price on other Signals will not get any more business than the old \$10 price.

The Public is wise to the situation. It's a Stewart year. The Public is all for the Stewart.

Stewart-Warner Speedometer Corporation, Chicago, Ill., U. S. A.





## The Ford is not Responsible for Rough Roads

But no matter how rough the roads or how fast you drive you can ride smoothly over every inch of the roughest roads when you equip your Ford car with



# Road Smoothers

QUICKLY APPLIED TO YOUR FORD CAR

Give you Ford car advantages, with heavy car comfort

**In Buying, Here's What You Must Look for in Order to Combine Comfort, Safety and Economy:**

1. A spring to effectively take up the shock.
2. An anti-rebound air chamber to check the rebound.
3. Anti-side motion links to prevent side rocking and swaying.

Each of these features is in itself vital to your comfort and safety. It's only when they are combined in one device that you will get the greatest pleasure from your car. Here's how the K-W Road Smoother fills all these requirements:

### The K-W Spring

A helical spring that effectively takes up the shock, made of electric smelted, chrome vanadium steel. The K-W bracket design allows almost *twice the length of spring action* or "travel" (in actual service) of any other.

### The K-W Air Chamber

The anti-rebound air chamber with its smooth fitting piston acts like a door check, and gently "eases off" the rebound of the spring. This is an exclusive K-W feature. Its design provides a strong, tough, self-lubricating piston, working in a dust-proof air chamber. It requires no attention.

### The K-W Side Motion Links

Made of the highest grade heat-treated drop forgings of remarkable toughness. This enables them to withstand the great strain put upon them. They prevent your car from pitching, swaying or skidding while making sharp turns.

**\$15 SET OF FOUR**  
ONE FOR EACH WHEEL



### K-W-Bushings

All bearings are phosphor bronze throughout. That means long life.

**But you can find all of these vital factors only in K-W Road Smoothers!**

That is why they lengthen the life of your car, by eliminating shock and vibration. Tire economy is assured, because K-W Road Smoothers enable the wheels (not the whole body of the car) to follow the contour of the road. That means no grinding off the rubber of the tires. K-W Road Smoothers always make good because they are built with characteristic K-W Quality throughout.

But after all's been said and done, it's results that count; and the K-W guarantee covers not only workmanship and material, but *results* as well.

K-W Road Smoothers are quickly and easily attached. No holes to drill and no tools necessary, except a wrench. And the final and biggest advantage you get from K-W Road Smoothers is that they increase the radius of your car's usefulness, and bring you home with "that satisfied feeling" after a day of comfortable motoring.

If your dealer can't supply you, sent prepaid upon receipt of price.

THE **K-W** IGNITION CO.  
2835 Chester Ave. CLEVELAND, OHIO, U.S.A.

Makers of the 125,000  
K-W Master Vibrators

# Jeffery Four

## \$1150



## 20% Dividend For Jeffery Buyers

WITH the Jeffery plant working three eight-hour shifts a day to supply the unprecedented demand for Jeffery pleasure cars and trucks, The Thomas B. Jeffery Company will share its prosperity with the American public.

You can now buy the famous Jeffery Four—the car that introduced the European type of light weight, high speed, high efficiency motor into this country—at the profit-sharing price of \$1150, a Jeffery dividend to you of 20%.

**Jeffery Light  
Four—\$1150**

**Jeffery  
Chesterfield Four  
—\$1275**

**Jeffery  
Chesterfield Six  
—\$1650**

**Jeffery Six-48  
—\$2400**

**Jeffery Quad  
Truck—\$2750**

In this car you get real economy from the Jeffery small bore, long stroke motor.

Comfort, in the roomy seats, smooth shock-absorbing spring action and scientifically designed upholstery.

Service, from the high quality of materials and excellence of workmanship—50% larger motor bearings than used on any other light, four cylinder models, imported annular bearings, Jeffery-built gears in the four forward speed transmission, and an unfailing electric equipment.

No expense has been spared in making the Jeffery Light Four a large, roomy, high-grade car. This new price is possible only because of the unexampled prosperity of The Thomas B. Jeffery Company.

Our dividend declaring price is the forerunner of a demand for Jeffery cars that makes the immediate order necessary to insure early deliveries. The Jeffery Four is now being shown in our salesrooms. Come in, write or telephone today.



**The Thomas B. Jeffery Company**  
Main Office and Works, Kenosha, Wisconsin



# DODGE BROTHERS MOTOR CAR

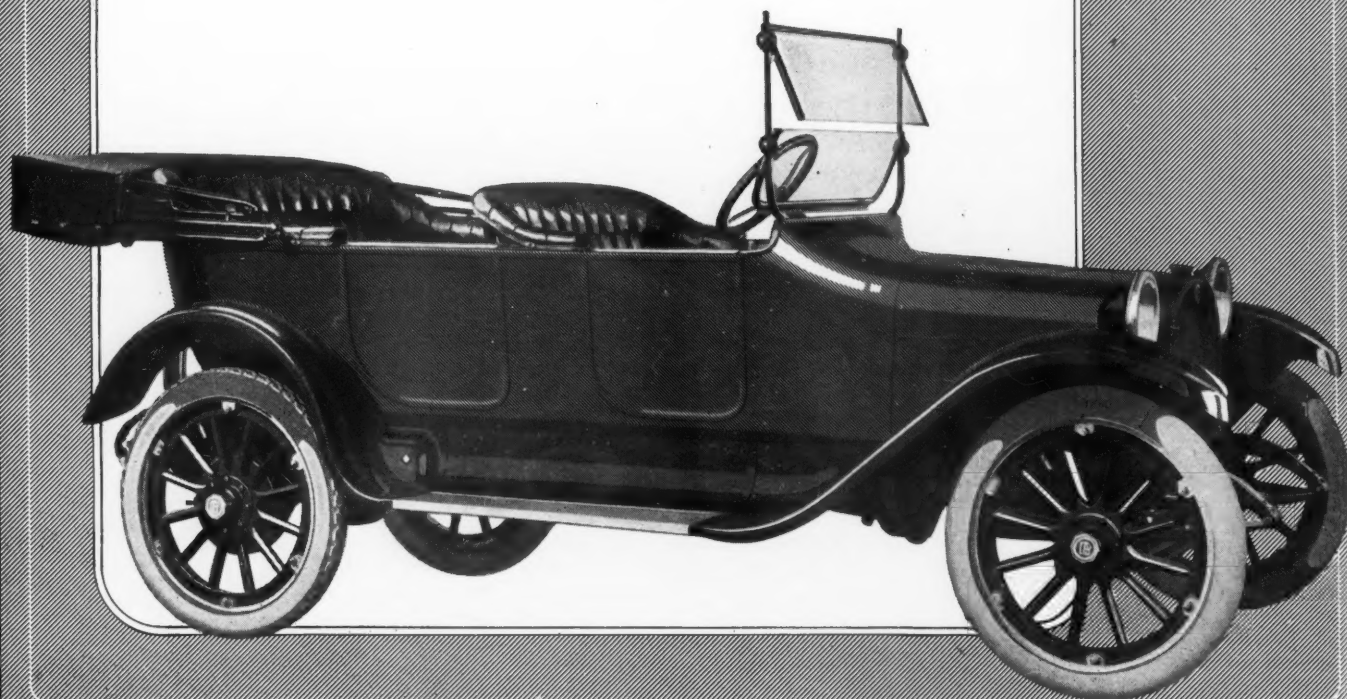
**Cross-country motoring this Spring has become a popular pastime with the thousands of owners of this car**

The one man top with its Jiffy curtains, the comfortable upholstering of real leather and natural curled hair, the buoyant, self lubricating springs, the powerful, flexible motor—all contribute to the pleasure of the trip

The wheelbase is 110 inches  
The price of the car complete is \$785  
f. o. b. Detroit

Canadian price, \$1100 (add freight from Detroit)

**DODGE BROTHERS, DETROIT**



*When Writing to Advertisers, Please Mention Motor Age*



# Oldfield Carried to Repeated Victories On Firestone Tires

## Congratulated by Governor and Mayor



Barney Oldfield, master driver of the world, receiving the congratulations of Governor Johnson of California (on the right) and Mayor Ralph of San Francisco (on the left).

**BARNEY'S** victories on Firestone Tires are piling up fast this year. In March he captured two notable events—the 300-mile Non-Stop Venice Grand Prix, at Los Angeles, and the 100-mile Non-Stop at Tucson, both on the same set of Firestone Tires—total 400 miles, practically one non-stop racing grind for these four tires.

Into the few hours of these terrific races is crowded all the hard use that ordinary automobile travel gives tires in many months. Nothing short of Firestone quantity and quality of materials can possibly deliver such service.

Study the section. The same relative values, the inbuilt extras, are in all sizes of Firestones. You

will find everything in a Firestone that ought to be there. Firestone Tires are vulcanized by the "two-cure" process. This is more expensive than the "one-cure," but it allows rigid inspection in the making and eliminates fabric buckles and other defects.

The sections show these things—the mileage proves them. Ask any neutral repair man which manufacturer gives the most in quality. He cuts into all makes of tires. He knows.

**FIRESTONE TIRE AND RUBBER CO.**  
"America's Largest Exclusive Tire and Rim Makers"  
Akron, Ohio  
Branches and Dealers Everywhere

### Firestone Net Prices to Car Owners

|       | Case Round Tread | Case Non-Skid | Grey Tube | Red Tube |
|-------|------------------|---------------|-----------|----------|
| 30x3  | \$ 9.40          | \$10.55       | \$2.20    | \$2.50   |
| 30x3½ | 11.90            | 13.35         | 2.60      | 2.90     |
| 32x3½ | 13.75            | 15.40         | 2.70      | 3.05     |
| 34x4  | 19.90            | 22.30         | 3.90      | 4.40     |
| 34x4½ | 27.30            | 30.55         | 4.80      | 5.40     |
| 36x4½ | 28.70            | 32.15         | 5.00      | 5.65     |
| 37x5  | 35.55            | 39.80         | 5.95      | 6.70     |
| 38x5½ | 46.00            | 51.50         | 6.75      | 7.55     |

### Actual Size 5-inch "Non-Skid" FIRESTONE

Fig. 1. 7 plies of Sea-Island fabric in Firestone —some are satisfied with 6.

Fig. 2. Extra coating of finest rubber between fabric layers in Firestone —not in the ordinary.

Fig. 3. ½ inch Pure Para Rubber cushion layer in Firestone —none in the ordinary.

Fig. 4. 3-32 inch Breaker Strip of Sea-Island fabric and high-grade rubber in Firestone —less in the ordinary.

Fig. 5. ½ inch Tread, tough, resilient, gripping in Firestone —less in the ordinary.

Fig. 6. ½ inch side wall of strongest rubber in Firestone —less in the ordinary.

Fig. 7. Firestone Bead, Built into tire specially for clincher rims in Firestone.

In the ordinary tire the clincher part of bead is only a patch applied to straight side type to fill "clincher" space.

**Yet you pay only \$39.80 for this 37x5 inch Firestone NON-SKID—20% below the average of four widely advertised makes.**



UNIVERSAL

Fits Any  
Shackled  
Spring  
Price per  
Pair

**\$10.00**

# The NOXAL

## The Universal Shock Absorber

The car that does not need a Shock Absorber does not exist unless it is equipped with the NOXAL.

It is the vibrations, too rapid for the capacity of any leaf spring, that crystallize the frame and other parts of your car and cause discomfort to your passengers and yourself.

## The Noxal Shock Absorber

Absorbs and eliminates 30 vibrations per second—more than **Three Times** the capacity of any leaf spring.

They are built of Drop Forgings throughout, with Vanadium Steel Springs, Hardened Steel Shackle Bolts and Nickered Grease Cups.

The only point of moving contact is Bronze bushed, making them everlasting.

For sale by most live dealers. If yours does not have them in stock, order direct, and we will ship prepaid on receipt of price, with a money back guarantee of satisfaction.

We also make a NOXAL Ford Type with all the valuable features of the Universal at \$8.00 per set of four.

**The Noxal Company, 1404 Michigan Avenue, Chicago**

**MAKE \$250<sup>00</sup> A MONTH REPAIRING AUTOMOBILE TIRES**

Sounds like a lot of money—IT IS—A WHOLE LOT of MONEY to be earning CLEAR every month—yet it's what hundreds of men we have established in the Automobile Tire Repair Business are making. You let down the DRAW BRIDGE for SUCCESS to enter into your career by getting into business for yourself. The business for you is the one where investment is small—the returns quick and for cash—where the margin of profit is large—the demand for your PRODUCT or SERVICE constant and ever on the increase.

## A Haywood Tire Repair Equipment

answers to all of these requirements of Old Dame Fortune—the certainty of success in this business is as sure as anything in this world can be—Each year adds thousands of new Automobile Owners—they need YOU to keep their tires in service.

### Here Is Your Opportunity!

Be first to enter this new, big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnston, Tex., writes: "I have made as high as \$18 in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3000.00. That's going some! Operate a plant as a side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

### Repair Tires At Home

Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business. Auto owners—repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow, investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities, in this fascinating new business.



**HAYWOOD TIRE & EQUIPMENT COMPANY**

720 N. Capitol Avenue  
INDIANAPOLIS, INDIANA The New Money-Making Business—Start Now



# NASSAU TIRES

have set a new standard of service so far ahead of that established by the average tire, that we have coined a new phrase to describe it—"QUALITY PLUS."

QUALITY PLUS is no meaningless phrase—it is what enabled NASSAU TIRES to establish the following record of victories:



Ralph De Palma won both the Elgin and Cobe trophies at Elgin, Ill., last August, and broke the world's 100-mile record at Brighton Beach last September, all on NASSAU TIRES.

Last season Bob Burman in a PEUGEOT at different times lowered all the world's records from 10 to 100 miles on NASSAU TIRES.

And just a short time ago, Dario Resta, driving a PEUGEOT, not only won the Grand Prix on NASSAU TIRES, but eight days later—driving the same car—equipped with the *Same Identical Tires He Used in the Grand Prix*, won the Vanderbilt, and the tires are still good for hard racing service.

When such famous drivers select NASSAU TIRES to carry them through such gruelling contests as these, the QUALITY PLUS which enabled NASSAU TIRES to stand this punishment should guide you in your selection.

Exclusive and protected territory to dealers.

**THERMOID RUBBER CO.,** Factory and Main Office  
TRENTON, N. J.

BRANCHES: Chicago New York Philadelphia London  
Detroit Indianapolis Berlin San Francisco  
St. Louis Pittsburgh Paris



Within one year the four most famous racing trophies have been won on NASSAU TIRES

(A) Grand Prix Trophy (B) Cobe Trophy  
(C) Vanderbilt Cup (D) Elgin National Trophy



When Writing to Advertisers, Please Mention Motor Age





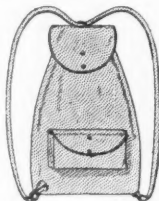
SIDE VIEW OF TENT ERECTED

## *Compac Auto Tent.* Is the Tourists Ideal Hotel

**I**T will cut down expense in touring to the coast—or on shorter trips. Lasts for years.

The COMPAC Auto Tent—that folds, and is conveniently carried anywhere on the running board or under rear seat—allows the healthful practice of sleeping out-of-doors.

Large and roomy, with partition, if desired. Water-proof, snake-proof, insect-proof. Easy to erect. Folds to 7x20 in. Price \$18.00. Other grades, \$24.00 to \$48.30. Write for details.



### Compac Ruck Sack

For carrying supplies on sight-seeing detours made from the car on foot. Absolutely water-proof. Slips over shoulders. A necessity on any tour. A convenience worth many times the price. \$2.

### Compac Duffle Bag



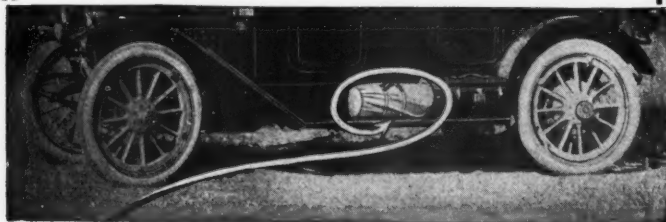
Necessary on any tour. Essential for carrying provisions and camp supplies, clothing, etc. More compact and handy than boxes or suitcases. Made in 4 sizes. Prices, \$1 to \$2.

**Dealers:**—These COMPAC articles—and many others—are in line for a big run. Some of the profits should be yours. Good discounts. Write today.

**COMPAC TENT COMPANY, Inc.**

414 W. Tenth St., Indianapolis, Ind.

Distributors: New York Sporting Goods Co., 15 & 17 Warren St., New York City; Simmons Hardware Co., St. Louis, Mo.



# Model F Sparton \$4

# Hand Operated

## When the Sparton Speaks It Clears the Way

On country roads its far-reaching, imperative voice shatters the air far ahead, warning firmly but politely, "Clear the Road." In city traffic a short, commanding smash note instantly compels attention. Your warning device is vital. Life itself depends upon it.

# SPARTON

### Safety Signals

are unfailing. There are no gears or complicated mechanism to clog or wear. *The simplest, most durable signal on the market.*

Many styles and sizes, but same in quality.

Hand operated, \$4.00  
Motor driven, \$8.00 to \$15.00

Dealers have them in stock for immediate delivery.

Write for our attractive dealer's offer including mounted signals wired for demonstration.

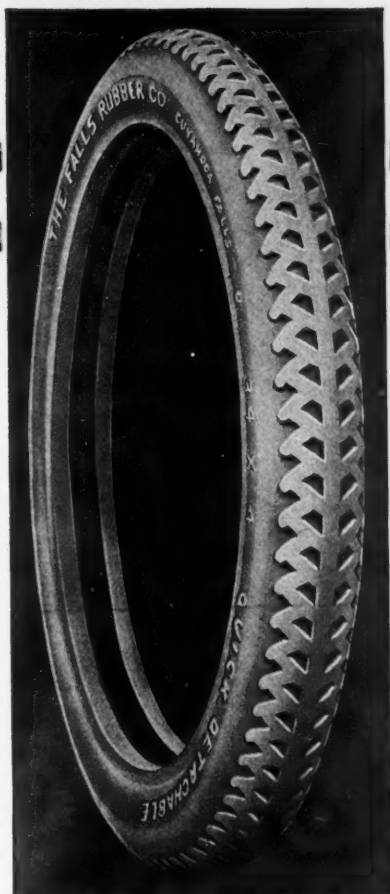
**The Sparks-Withington Co.**  
Jackson, Michigan

# Motor Driven

# Model D Sparton \$15

# "FALLS" TIRES

**GUARANTEED 5000 MILES**



**GUARANTEED 5000 MILES**

**T**HERE are two ways of making tires. One is to make as many as you can and the other is to make them as good as you can. Falls tires are made as good as we know how.

Users say they cost less per mile as proven by hundreds of testimonials.

**The Falls Rubber Company**  
Cuyahoga Falls, Ohio

**CLEVELAND BRANCH:** 2001 Euclid Ave., Cleveland  
**Eastern Distributors:** The Falls Tire Co., 633 N. Broad St., Philadelphia, Pa.; Royal Tire Co., 833 Seventh Ave., New York City, N. Y.; Falls Tire Co. of New Jersey, 64 Halsey St., Newark, N. J.  
**Western Distributors:** Prigge Bros., 1344 S. Michigan Ave., Chicago, Ill.; The Denver Rubber Co., 516-518 Sixteenth St., Denver, Colo.; Naegle & Lamb Co., 1204 Hennepin Ave., Minneapolis, Minn.; Costello-Lang Co., 556 Golden Gate Ave., San Francisco, Cal.

# "FALLS" TIRES



## Make Tire Pumping a P-L-E-A-S-U-R-E

There's a way to enjoy next summer's heat when a tire "goes flat." There's a way to laugh in the face of the hot sun, and make tire pumping—

### A Recreation

—a chance for a quiet smoke, while a MAYO Spark Plug Pump, and your motor, do the work.

## MAYO *SPARK PLUG* PUMP

### An Economy

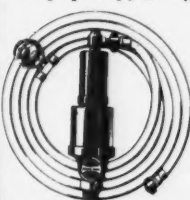
—you can't afford to overlook. It costs much less than one ruined casing—and it can save many —while taking the place of backache-producing hand pump tussles.

The MAYO comes complete—**For \$10**

—equipped with 12 ft. hose, gauge, and all connections. Pumps fresh, pure air only. Adapted to any car. Substituted instantly for any spark plug. Built with metal rings, like your motor—and lasts as long. You can test a MAYO—

### On 30 Day Free Trial

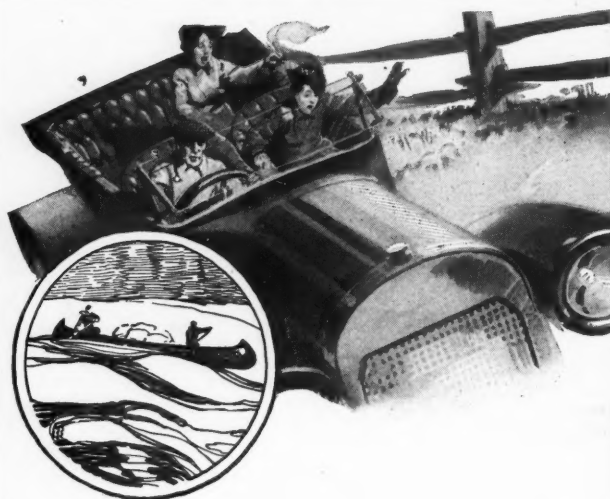
—on your own car. MAYO Q. D. Spark Plug, \$1.50 extra; MAYO Ford Pump, \$8, complete; MAYO valve cap pump, \$15, complete.



**MAYO**  
**Mfg. Co.**  
55 E. 18th St.  
Chicago







## The Brakes won't hold!

Did you ever get sucked into rapids in a canoe?

You feel the same way when your brakes suddenly fail you on a bad hill. Remember—your brakes are not infallible. THEIR EFFICIENCY DEPENDS ENTIRELY ON THE BRAKE LINING. If the brake lining suddenly goes bad—becomes friction shy—you have no more control over the car than you would have on a barrel shooting Niagara.

## Thermoid HYDRAULIC COMPRESSED Brake Lining—100%

Thermoid is Brake Lining all through—not merely on the surface. It is a substance which has been hammered by hydraulic compression to a uniform density—it is not a stringy, loosely woven fabric with only friction surfaces.

Thermoid will still hold even though worn paper thin. It is 100% brake lining.

Watch your brakes. Guard your safety with Thermoid.



Cannot be burned out nor affected by oil, heat, water, gasoline or dirt

**Thermoid Rubber Co.**  
TRENTON, N. J.

OUR GUARANTEE:  
Thermoid will make good or we will.

## HERE IT IS!

The greatest Shock Absorber ever made, sold at the right price and easily attached by the car owner. These cardinal points make the value:



Pat. Oct. 2, 1914

The four corner bolts keep the spring aligned; whatever way the sway comes, the spring must give a straight pull.

Spring is enclosed dust-, grit- and water-proof in a glove-smooth housing packed with grease.

The sliding cam acts like a wrist of steel; gives to every sway yet holds firmly.

**JUST LOOK AT THE PRICES!**

For Ford.....\$11 per set of four  
Cars up to 3000 lbs.....\$16 per set of two  
For cars 3000 lbs. and up...\$18 per set of two



Designed to take care of the real problem of protection against shocks.

Dealers, by carrying a small stock of the U. S. Absorbers, together with extra springs, can supply the demand of any weight car at a moment's notice.

MANUFACTURED BY

**B. & L. Auto Lamp Co.**

507-509 W. 35th St., New York, N. Y.

Pat. Oct. 2nd, 1914

## 1915 J. & B.

### SPECIAL FORD MASTER VIBRATOR

The best

at any

price.

The

Master

of

Master

Vibrators.



Equipped with the famous J. & B. indestructible points.

ORDER FROM YOUR JOBBER OR DEALER

Guaranteed for Life  
**\$8.00**

Complete with all fittings

**J. & B. MFG. COMPANY, Pittsfield, Mass.**

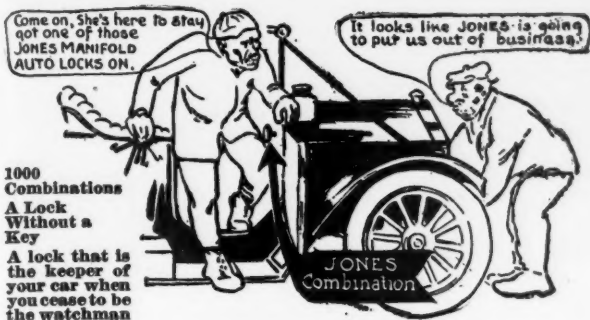
New York Branch  
1777 Broadway

Chicago Branch  
W. A. Barrett  
916 Michigan Ave.

Boston Branch  
J. J. Kelleher Co.  
22 Tracott St.



# Death Blow to the Auto Thief and Joy Riders



1000 Combinations  
A Lock Without a Key  
A lock that is the keeper of your car when you cease to be the watchman

**The business of dealing in stolen automobiles is systematized**

**Protect your car while you can**

The ordinary make-shift ignition lock, so-called gas lock or any key lock, will not protect your car against their "art."

You don't want theft insurance, but assurance that theft is impossible and that is what we can give you for the life of your car at about the cost of one year's insurance.

**Sold under your money back guarantee if not satisfactory in every respect**

1000 combinations. Can change combination in five minutes. Locks the gas in manifold. Operates by knob on dash. Nothing to get out of order. Easier to lock and easier to unlock than a key lock. Stealing automobiles is easier, safer and more profitable than any other field for the thief and joy-rider. Price \$10, including new aluminum manifold.

**REPRESENTATIVES WANTED IN EVERY LOCALITY**

**"Big Seller!"**

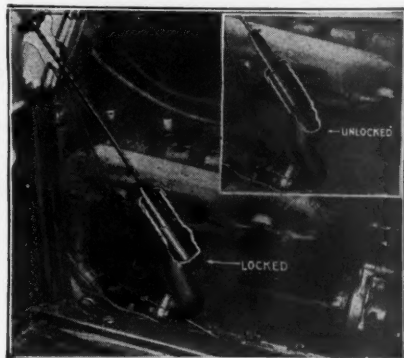
Can be unlocked in the dark

**Write Today**

**Jones Auto Lock Co.**

Home Office,  
Jones Auto  
Lock Company  
TACOMA, WASH.

Factory,  
258-255  
Lafayette Blvd.  
DETROIT, MICH.



Showing Jones Auto Lock installed on car



**New, Effective, Low Priced**

A strongly built front glass for auto lights, solving the dimmer question, scientifically diffusing the light, mellowing the illumination, and giving

**All the Light Without the Glare**

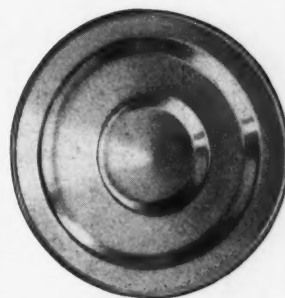
Now working a revolution in auto lighting. You must see it to appreciate its advantages. Prevents collisions and ditching, adds safety to your car; no switches; all the light you need all the time and everywhere. Fulfills police regulations.

Retails for only \$2.50, \$3 and \$3.50 a pair anywhere in the United States. Fifty cents additional in Canada.

**Look, Mr. Dealer:**

A big advertising campaign is creating a great demand for the Lancaster Safety Lens. Your customers will buy them.

Let us send you a half dozen assorted sizes ON APPROVAL, PREPAID. With them we will send you a pair for your own personal use, if you will send us the diameter of the front glass of your lamps. When you buy the six pairs this one is yours FREE.



Pat. Applied For

You cannot lose on this proposition. It is our faith in the lens put into action. We offer an absolute guarantee of satisfaction to the user, or money back.

There's a good profit for you, too. Our other goods are sold everywhere now, and all our organization backs the Lancaster Safety Lens. Get in under our absolutely safe introductory offer. You needn't spend a penny except for postage.

Ample literature and special letters for your customers, too.

Send us the order. If you are not pleased with terms, goods and advertising, send them back at our expense.

**That is the strongest proposition we know how to make. Take it and ring up on the cash register.**

Full particulars and the Lancaster Book of Light, telling how to overcome your light difficulties, sent free to any car owner for a postal.

**THE LANCASTER LENS COMPANY**  
117 West Main Street LANCASTER, OHIO



## The "Velvet" Lady

Are your passengers riding on "Velvets"? Remember, it's the lady in the rear seat that gets the full effect of all the "bumps." There is only one comfortable seat in a car not equipped with shock absorbers—that's the driver's seat—while every seat is comfortable in a car equipped with

### VELVET SHOCK ABSORBERS

#### Exclusive "Multiple Spring" Feature

Remember the Velvet is the only Multiple Spring Absorber on the market. This feature is patented. It means 126 coils in eight soft, cushiony springs, as against 20 to 44 coils of stiff, heavy spring in the absorbers of the single coil spring type. You drive a multiple cylinder engine—why not use a multiple spring absorber? The principle is the same.

#### First REAL Absorber for FORDS

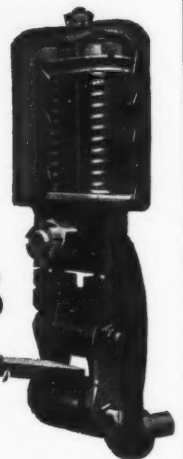
Complete Set of 4

**\$15**

For Ford owners we make a special type of Velvet Absorbers. The same construction—the same general principle and the same efficiency as the Velvet for higher price cars. Don't experiment with so-called "Cheap" Ford Absorbers. We've done the experimenting for you. It's taken us over a year to perfect the Velvet for the Ford, but now we know it is right. Buy from a responsible company that does not make extravagant claims nor untrue statements.

Write for Exclusive Agency Proposition

**John W. Blackledge Manufacturing Co.,** 2101 Michigan Ave. CHICAGO



**No Car Is "Completely Equipped" Without Shock Absorbers—Ask for VELVETS on YOURS**

## Removes Rims Instantly

HERE is an instantaneous tool that does not touch the tire, but opens the rim lock, overlaps the rim ends, and holds them contracted, to permit the immediate removal and replacement of tires in an *upright position*. Nothing to adjust. Weighs 2 pounds, rust-proof, and fits tool box.

**Friestedt  
Rim  
Contractor  
\$2.00**

For 4-inch or smaller Kelsey and Stanweld Rims. Guaranteed to make good every claim. Order direct or through your dealer.

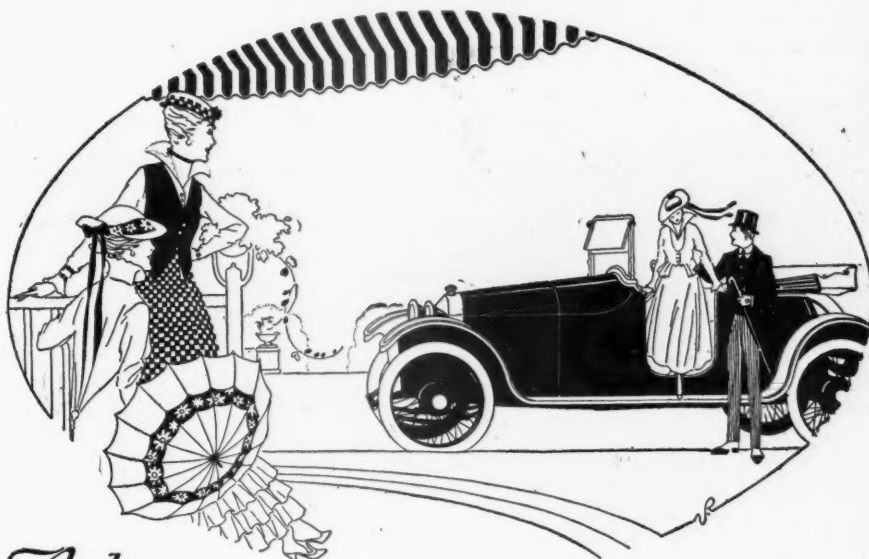
**Dealers:** Write today for attractive proposition. 75 per cent of the cars have these rims.

**FRIESTEDT RIM CONTRACTOR COMPANY**  
2930-2940 W. LAKE STREET CHICAGO, U. S. A.



**"IT OPENS THE RIM LOCK"**

When Writing to Advertisers, Please Mention Motor Age



## Admiration

is pride transferred to the onlooker, an induced respect for judgment, or appearance.

Scripps-Booth cars are built with pride, and constructed with self-respect, and are the apex of motor car luxury, art, finish and performance at any price in any weight.

## Scripps-Booth

Scripps-Booth cars therefore induce in the onlooker and bystander a respect for ownership, an admiration for the possessor, that is attained by no other car of medium weight in America.

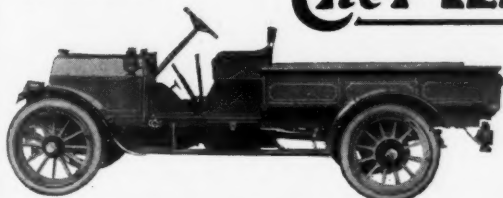
To admire is to enjoy. Our nearest salesfloor is therefore a place of pleasure to those motor car connoisseurs who appreciate quality of mechanism, luxury of riding, and of appointment.

SCRIPPS-BOOTH COMPANY, DETROIT, MICHIGAN

\$1200

## "The MENOMINEE" TRUCKS

FOR ECONOMY



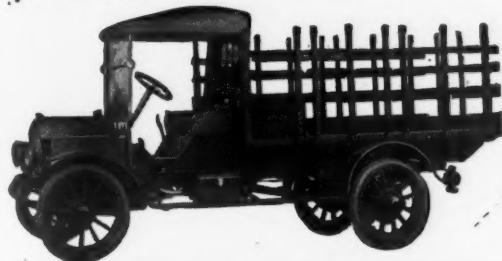
Model A-3, 1500-lb. Truck, Complete with Express or Stake Body, \$1200. Chassis only, \$1125

The grocers, the coal men, the merchants, the brewer, the wholesalers in your town—all are going to buy motor trucks, or go out of business behind a team of horses.

They won't all buy the same size car. But they may all buy from one dealer—a model built to suit their needs.

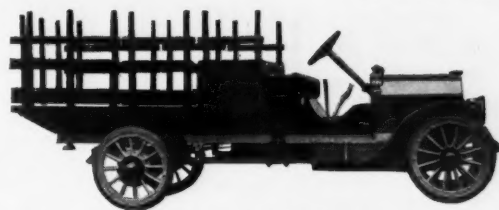
\$1950

Get in and represent the MENOMINEE, the easiest-selling truck, because in 3 models, it is built to fit the world.



Model C, 1 1/2-ton Truck, Complete with Express or Stake Body, \$1950. Chassis only, \$1800.

The horse cannot do the work. The motor truck must. The MENOMINEE will



Model B-3, 1-ton Truck, Complete with Express or Stake Body, \$1500. Chassis only, \$1400.

\$1500

**D. F. Poyer Co.**  
Menominee, Mich.

Some good territory still open. Live prospects for agents. Mail coupon today for catalog and discounts.

D. F. POYER CO., Menominee, Mich.  
Gentlemen: Send me complete information about Menominee Trucks together with your agency plan.  
Name .....  
Address .....





**BUDA MOTOR**  
"The part to buy the car by"  
ESTABLISHED 1881

**If the MOTOR is not right  
the car is wrong.**

To have *your* car right, build into it the Buda motor, known to the whole trade as "*The part that sells the car*" and to the general public as "*The part to buy the car by*."

It's both—and, by the way, it not only *sells the car* but *keeps it sold* because built to last by a company which never puts its brand on anything less than the best.

It keeps its owner happy and thereby makes him an unsalaried salesman for YOU.

Address: **BRANDENBURG & COMPANY**  
57th & Broadway, N. Y.  
1108 S. Michigan Ave., Chicago      1311 Dime Bank Bldg., Detroit

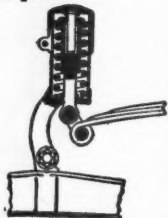
**THE BUDA COMPANY, HARVEY CHICAGO ILLINOIS.**

**\$9 A SET OF 4 FORD "O-G" SHOCK ABSORBERS \$9**  
For Ford Delivery, Touring Cars and Runabouts

Adjustable when placed on the car, and automatically adjusted in service. Can be attached in fifteen minutes.

Sold with a guarantee that covers workmanship, material, finish and satisfactory service during the use of car.

The above illustration shows method of attaching to rear of Ford car. Bearings of fine material, lubricated grease cups, there can be no rattle or squeaks.



**Shock Absorbers do not prove to be entirely satisfactory.**

This illustration makes clear the method of attaching the front "O-G" and shows the large amount of spring action possible. By twisting the cap, the spring in the absorber is tightened or loosened, giving the necessary increase in spring tension.

**Immediate refund if the "O-G"**

**Write today for particulars**

**OXYGEN GENERATOR COMPANY**  
301 RIVER STREET TROY, N. Y.

**Complete Generating and Decarbonizing Outfit for \$15.00**

Sold with complete equipment, extremely economical to operate and guaranteed in every particular.

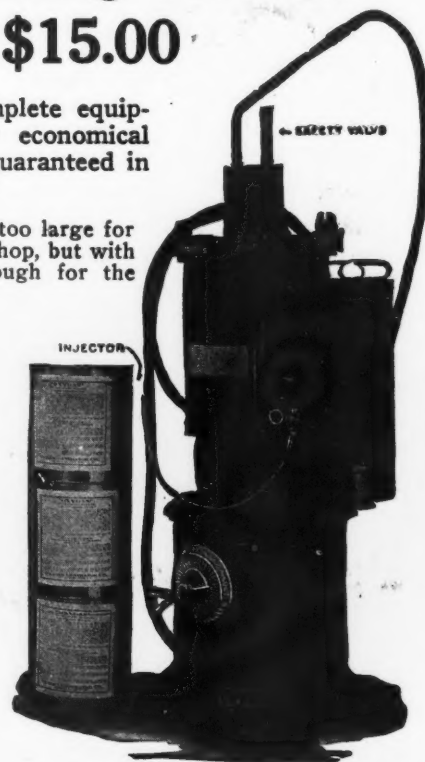
A generator not too large for a small garage or shop, but with capacity great enough for the largest.

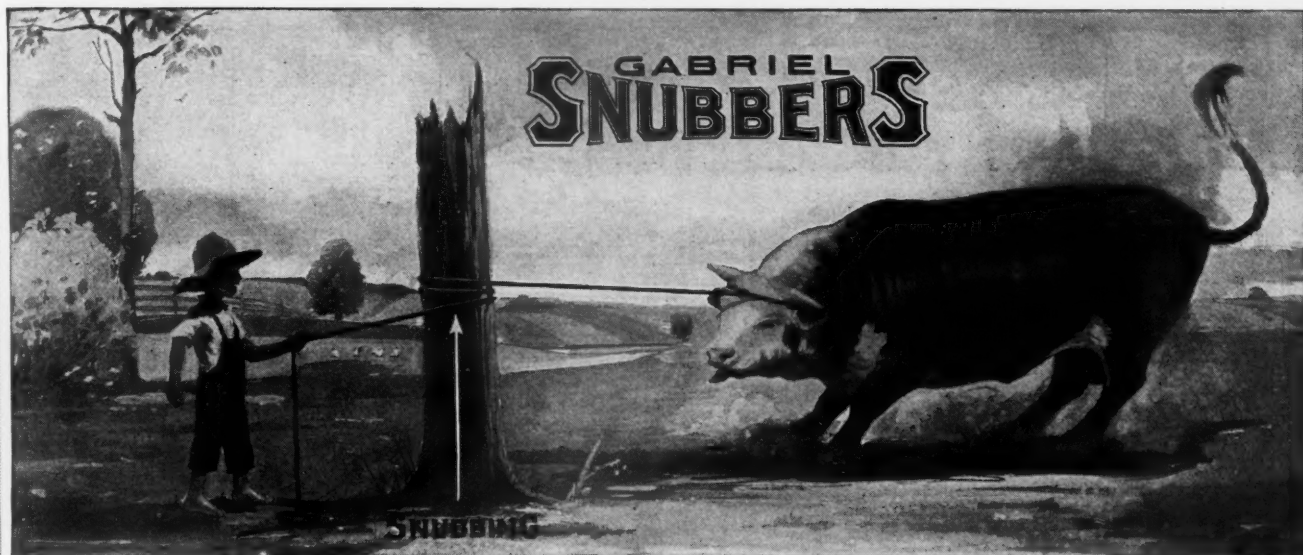
No tanks to bother with, no delay in securing material. A practical equipment that can be operated by any one.

Carbon can be removed from any cylinder in three minutes.

Oxygen can be generated in three minutes.

It is a time, money and labor saver.



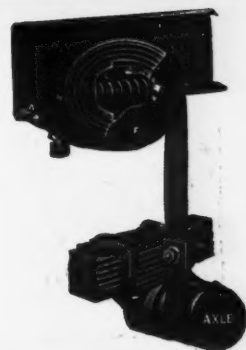


### "It's All in the Coil"

It's the coil of rope around the tree that holds the bull. The harder he pulls, the tighter the rope coils and the greater is the resulting friction.

It's the same way in driving your car equipped with Snubbers. The bigger the bumps, the tighter the layers of belting will coil around the center spring, and the greater will be the *frictional resistance against rebound* of springs and car body. Snubbers *automatically* exert just the right amount of resistance against spring rebound, to ensure practically the same easy riding on *rough* roads as on *smooth* roads. *Do you get that? Write for Booklet.*

**GABRIEL HORN MFG. CO., 1415 E. 40th St., Cleveland, Ohio.**



### The New Improved GARFORD Electric Warning Signal

—is the easiest of all to operate. Pressure AT ANY POINT on the new cushion push button, insures quick and certain contact. Always at your service—and absolutely guaranteed. Most dealers handle GARFORD Clear-Toned Signals.

**\$8**

**Dealers:** The new GARFORD Cushion Contact sells the signal fast. Write for details.

**THE GARFORD MFG. CO.**

2503 Olive St. Elyria, Ohio

Branch: The Garford Mfg. Co., Kansas City, Mo.

Distributors: The Dean Electric Co., Seattle, Wash.; The Dean Electric Co., Los Angeles, Cal.; The Sumter Telephone Supply Co., Sumter, S. C.  
Canadian Distributors: The Tire Import Co., Toronto, Canada.





## The Best Metallic Brushes

# SPEER

For Manufacturers and Dealers

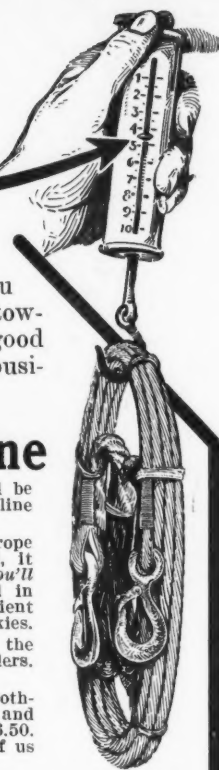
The SPEER trade mark is the sign of distinctive quality—the kind your custom demands. Absolute reliability and thorough satisfaction go with every SPEER Metallic Brush.



"SPEER" means negotiable "good will." Liberal discounts. Write for particulars.

**Speer Carbon Company**  
Saint Marys Pennsylvania

## SEE HOW LIGHT AUTOWLINE IS



Basline Autowline tips the scale at four and a half pounds. There's "nothing to it" till you want a tow, and then Basline Autowline is the real thing. Put a good strong, purring motor at the "business end" of

## Basline Autowline

and a sick car at the other, and there'll be some towing done right off. Basline Autowline is get-home insurance.

Being Yellow Strand Powersteel wire rope with patented snaffle hooks at each end, it never lies down on the job. It's a cinch you'll need one—some time. What's the good in tempting chance? All dealers. In convenient patented package; price \$3.95 east of Rockies.

POWERSTEEL AUTOWLOCK deprives the auto-thief of power to steal. Sold by dealers. Price \$2.00.

POWERSTEEL TRUCKLINE is a big brother to Basline Autowline. Very convenient and mighty strong. Price, east of Rockies, \$6.50. If your dealer cannot supply you, order of us direct.

**FREE** Autowline, Autowlock and Truckline circulars. Write for them.

**BRODERICK & BASCOM ROPE CO.**

813 N. 2nd St., St. Louis, Mo. N. Y. Office, 76 E. Warren St.

Makers of famous Yellow Strand Powersteel wire rope

## The AERMORE Exhaust Horn

Polite Yet Effective

Can be heard a block or a mile. It pleases the ear whether blown low or loud. Just the horn you want. Here are the reasons:

**Musical Sound**—Built on the principle of a pipe organ. Four notes, blown at once, produce perfect harmony.

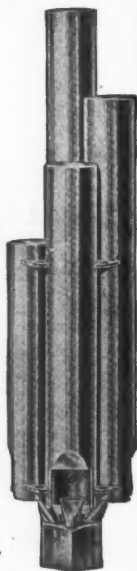
**No Upkeep**—First cost is only cost. Made of brass tubes, nickel-plated. Nothing to wear out.

**Reliable**—Cannot clog. Cannot be tampered with when car is standing.

**Clears the Way**—Amplly warns but does not frighten.

**Easy to Put On**—Nothing shows but the foot pedal.

Get it from almost any dealer. Price \$5.50 to \$7.50 complete. Every horn guaranteed. Sold direct where local dealer does not carry it. Descriptive folder sent on request.



**The Fulton Company**  
727-729 National Ave., Milwaukee, Wis.

## "WHITNEY" CHAINS

The Most Practical for Motor Trucks



in one of the most modern  
fireproof  
factories in the  
country.

**THE WHITNEY MFG. CO.**  
HARTFORD, CONN.

Chains

Keys

Hand Milling Machine



## Stop Pressure Guess Work —and Save Time

If you are in the habit of making 2 or 3 tests with your pressure gauge whenever you pump a tire—each time detaching the pump from the valve—you are wasting time and energy. You can save the time—perhaps enough to meet an important appointment—and improve the state of mind that follows a low pressure reading, by using—

### The Automatic "Pop-Off" Pressure Gauge

—that screws on with the pump and exhausts automatically when the required pressure is reached.

This handy little device—convenient to carry, and simple to attach—safeguards you against over or under-inflated tires. It eliminates all guess work and trial tests. It is absolutely certain, and never fails. For use with both hand and motor pumps, alone or with dial gauge.

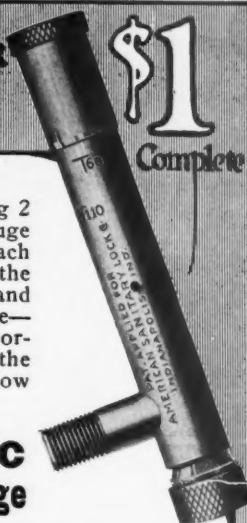
#### Satisfaction—Or Money Back

—is the way we prove our claims. Try a "POP OFF" Gauge on your car.

Ask your dealer for a "POP OFF" Automatic Gauge, or write us direct, enclosing \$1, and prompt delivery will be made.

#### AMERICAN SANITARY LOCK CO.

1067 S. East St., Indianapolis, Ind.  
New York Office: Exchange Bldg., 145 W. 45th St.  
Baltimore, 37 Custom House Ave.

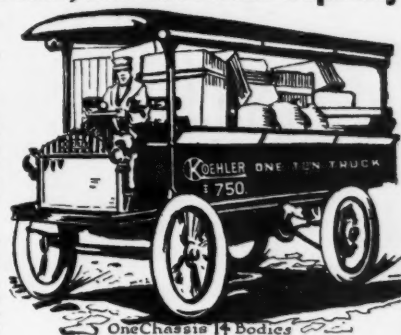


## Greatest Value at the Price; Lowest Price for the Capacity

That's Why the Koehler is

### EASIER to SELL

than to sell against. Mr. Dealer: Will it be you or one of your competitors who will make it hard for anyone else to sell any other make of truck in your territory?

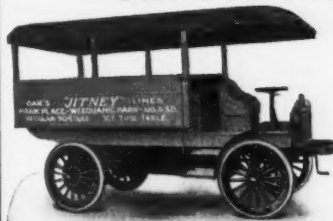


One Chassis 14 Bodies

**Brief Specifications.**—Motor—24 H.P. water-cooled, 4 cycle. Ignition—High Tension Magneto. Tires—36 in. solid standard removable and non-skid demountable pneumatics optional at extra price. Tread—58 in. Rear Axle—2-in. square. Force feed circulating oiling system without adjustment. Bearings—Bronze shells lined with babbitt. direct-line drive—emergency gasoline supply. See complete catalog H for details.

# KOEHLER \$750

One Ton Truck



### JITNEY BUS

**INCLUDED** It is but one of the fourteen open and covered body types. There is a highly profitable business in every town, city or village for anyone who establishes cheap motor passenger service.

Completely equipped 14 passenger pay-as-you-enter jitney bus, \$875

Send for "JITNEY BUS HISTORY" and Catalog H.

H. J. KOEHLER S. G. CO., 292 Halsey St., Newark, N. J., U. S. A.

# MERCER

## Example of Engineering Skill

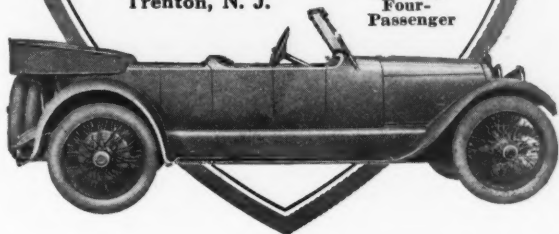
The Mercer is built on sound engineering and scientific principles. Every detail, large and small, is well considered and subjected to exhaustive tests, with the result that the Mercer is extremely high grade, and one of the simplest and easiest riding cars on the road.

Literature Mailed on Request

#### MERCER AUTOMOBILE CO.

800 Whitehead Road  
Trenton, N. J.

22-70  
Sporting  
Four-  
Passenger



# DIXIE 20TH CENTURY MAGNETO

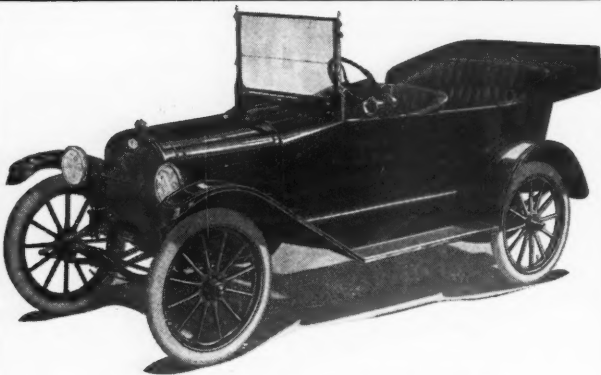
A high-tension magneto is absolutely independent—self-contained and aloof from any outside source of current. With a high-tension magneto there is no use for batteries or dry cells.

### SPLITDORF Electrical Co.

NEWARK, N. J.



(All SPLITDORF features are fully covered by patent or patents pending)



## METZ "25"

*The Quality Car*

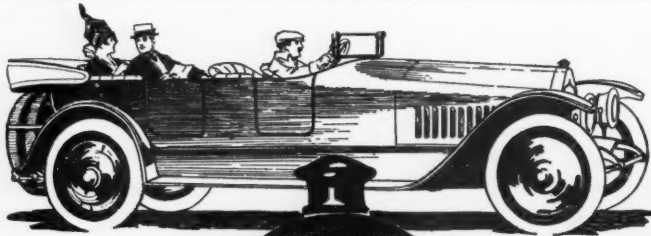
**\$600**  
**Touring Model**  
**Equipped**  
**Complete**  
**Including:**  
**Gray & Davis**  
**Electric Starter**  
**and**  
**Electric Lights**

This new Metz Touring Model is just as interesting to DEALERS as it is to prospective purchasers. It means bigger sales, more customers, and ALL of them satisfied.

In addition to complete electric system, equipment includes rain-vision built-in windshield, instant one-man top, heavy tufted upholstery, deep cushions, 32 in. wheels, 3½ in. Goodrich clincher tires, Bosch magneto, Hyatt roller bearings, built-in gasoline gauge, speedometer, signal horn, tools, etc.

*We want to hear from Dealers*  
*Write for particulars and New Catalog "K"*

**METZ COMPANY, Waltham, Mass.**



# National

### All's Well Behind this Radiator!

**T**HIS distinctive radiator is a time-honored guarantee that "all's well" with the car behind it. In the world's fiercest contests it has been this distinct radiator, sighted far down the track, that has so often heralded another National victory.

When the man on the curb sees this radiator on your car, he credits you not only with good taste, but with sound judgment, for the beauty of the National's performance is as superior as its beauty of appearance. Fifteen successful years of car building warrants your confidence in the National. The National owner knows his car is full value at \$2375.

**National Motor Vehicle Co., Indianapolis**

# To the Trade

Here is a live inquiry which may lead to some good foreign business if followed up quickly. The name and address of the inquirer will be given upon request.

Class Journal Co., 239 West 39th St., New York

Gentlemen:—

I arrived here a few weeks ago from France, where I am established as an automobile dealer and importer of automobile accessories.

Having noticed your paper as being the most popular motor journal extant, I am taking the liberty of asking you if you could not put me in touch with some American automobile supply and accessories manufacturers with a view of my securing the agency for their product in France.

I would like to secure such accessories as electric and hand horns; cheap but practical spark plugs with metric threads; tire covers; windshields; low priced vulcanizers; power tire pumps with metric threads; electric lighting outfits and any other specialties suitable for use in France.

I am ready to enter into a contract for the sale of such articles and will agree to contract for so many per month for a specified period.

If you can help me in this matter or suggest any method whereby I can secure a complete list of the names and addresses of the people engaged in the manufacturing of automobile supplies and accessories, I should feel grateful and may be able to assure them some appreciable business.

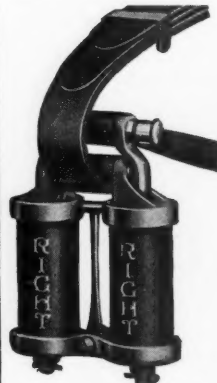
In the hope of hearing from you upon this subject at your earliest convenience, I am

Yours very truly,  
 (Signed) Name on request.

ADDRESS ADVERTISING DEPARTMENT

**THE CLASS JOURNAL CO.**

239 W. 39th Street, New York



### DON'T BE MISLED!

This is the only

**RIGHT Shock Absorber**  
**at the RIGHT Price—\$15**

Complete set for rear

Right Shock Absorbers have a resilient action of two inches which will absorb even the most violent road shocks.

They are of the twin cylinder type, as it is not possible to incorporate this high degree of shock absorber efficiency in the single cylinder construction.

AT ANY "RIGHT" DEALER

Right Motor Specialty Co., 1324 Michigan Ave., Chicago, Ill.

"I can't get MOTOR AGE on the news-stands. For the enclosed 10c please send me a copy of the \_\_\_\_\_ number."

We can't help it if the news-dealer didn't order enough to supply everybody.

He isn't to blame if he buys only enough to fill his orders.

You can't expect the demand to be exactly the same at all news-stands all the time. If you don't order ahead at the news-stands you're likely to be disappointed often. A subscription for the year at \$3.00 is disappointment insurance. Your news-dealer will take your subscription or we will if you'll mail it to

**MOTOR AGE**  
 1004 Karpen Building, Chicago

# STOP THE THIEF

ATTACHED ANYWHERE ON YOUR DASHBOARD



Every Lock Has a Different Combination

## The Dial Auto Lock

Insures and protects your car for all time from thieves and joy riders by an effective combination lock which controls the ignition system and makes starting impossible without the combination.

No keys to lose or be duplicated. No gloves to take off, no fumbling in pockets for switch key. Works on any car and does not interfere with any part.

Send Us \$6.75 for a Dial Auto Lock—use it 10 days at our expense—test it every way—if it fails you return the Dial Auto Lock and get your money back. (That's what we think of it.)

*Cheaper than insurance and insures the continued use of your car. No worry at the theatre or away from home, shopping, etc., etc.*

If you keep your car in a public garage the Dial Auto Lock is the thing, as your car can be pushed into position for washing, repairs, etc., but is safe from joy-riding chauffeurs.

Dealers and Manufacturers: Write for Our Proposition

**DIAL AUTO LOCK COMPANY**

MANUFACTURERS

Offices: Holland Building

ST. LOUIS, MO.

**ENGINE SALE**

**REDUCED ENGINE PRICES FOR QUICK SALE**

BRAND NEW STOCK MODELS

Carrying our regular guarantee

will be SACRIFICED to save moving from our Peru, Indiana, factory to our new plant at Pittsburgh

SINGLE ENGINES OR QUANTITY

MOTORS ONLY OR UNIT

POWER PLANTS

**4 CYL.—4 CYCLE**

3½x4½ 4½x5½  
4x5 5x6

**ENGINE SALE**

WRITE OR WIRE  
Pittsburgh Model Engine Co.

HOMewood STATION

PITTSBURGH, PA.

# HASSLER



Shock Absorber  
for FORD  
CARS

## THE ONE YOU WILL EVENTUALLY BUY

No Rebound—No Tossing—Easy Steering—Safe Driving.

The Patented Lever with Stop prevents the Up-throw of the Leaf Spring. No other shock absorber holds down the Leaf Spring.

The Spiral Spring does not support the direct weight of the car and works over a range of three inches.

**\$20.00 PER SET OF FOUR**

Dealers, write for attractive discount and trial proposition

**Robert H. Hassler, Inc.**  
INDIANAPOLIS, IND.



**DEALERS**

## The Best Selling Tool Box for Ford Cars

Keep your stock moving—turning into money fast—

By handling the SERVICE FORD TOOL BOX, that combines highest quality, classy appearance, and exceptionally low price.

Ford owners are anxious to buy—All dealers are wise to handle—

## Service Ford Tool Box at a Price That's a Bargain

Sells to consumer for only \$2.25—and our price to you is from 70c to 75c lower than that of other jobbers offering inferior boxes. In SERVICE FORD TOOL BOX you get—

Very best open hearth, full cold rolled, full pickled reannealed and lined stock obtainable, with guaranteed friction fitted covers. Anti-rust sheet bottoms. Patent lock top. Size 22x9x7. Just fits the Ford.

Order today, at special dealer's price. Satisfaction or money-back basis. Write now.

**SERVICE MOTOR SUPPLY COMPANY**  
Washington Boulevard and Des Plaines Street  
CHICAGO

**JOBBERS**



**Dyneto**  
TRADE MARK

Weight 45 lbs.

REGISTERED

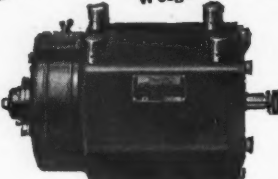
The Single Unit Electric Starting and Lighting System. Lighter, yet more powerful than most two-unit systems.

Famous on the Franklin

Write for Catalog and Full Particulars.

**DYNETO ELECTRIC CO., Syracuse, N. Y.**

Send Us Your Electrical Problems



**KB QUALITY UNIVERSAL JOINTS**

WE ARE SPECIALISTS IN THE MANUFACTURE OF UNIVERSAL JOINTS

Made from finest drop forgings, case hardened throughout. Interchangeable with other Universals. We guarantee prompt deliveries

**AMERICAN DISTRIBUTING CO., Detroit, Mich.**

Factory Sales Representatives.

**Kinsler-Bennett Co., Hartford, Conn.**

## Moline-Knight "40"

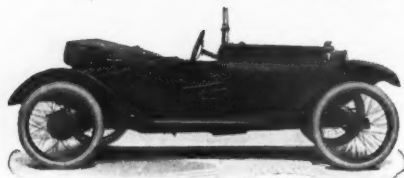
F. O. B. **\$1475** Factory

Guaranteed 40 horsepower; 118-inch wheel base; 34x4-inch tires (non-skid rears); 5 passenger; spiral bevel gear rear axle, electrically started and lighted, power pump, left drive, center control, completely equipped. 50 horsepower touring, roadster, sedan, limousine models, \$2500 to \$3800.

Write for detailed specifications.

**Moline Automobile Co., East Moline, Ill.**

## The Cornelian Light Car



Speed Comfort Beauty Safety

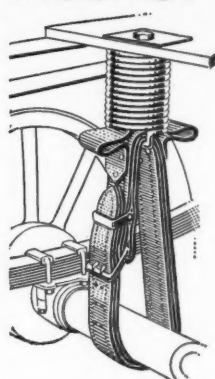
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**BLOOD BROS. MACHINE CO.**

ALLEGAN, MICHIGAN

Formerly of Kalamazoo

## Hoover Shock Absorber



Prevent the jars and jolts of motoring and save the springs of the car. Simple, positively nothing to get out of order. Does not interfere with the downward movement of the car springs. The latigo leather straps are guaranteed not to be affected by heat, cold, moisture, water or mud. The Hoover is not attached to the axle and cannot therefore interfere with the downward movement of the car body. Noiseless. The Hoover is the lowest priced shock absorber on the market and the most efficient. Why pay more? Quickly and easily attached, full instructions with each set.

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No. 20 for Light Cars 1000-1500 lbs. .... \$5.00  
Such as Saxon, Metz, Twombly, etc.

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No. 24 Rear Springs, fits all Ford models. .... \$7.00

No. 25 Front Springs, fits all Ford models. .... \$7.00

In ordering, state name and model of car.

If your dealer cannot supply you, send direct, charges prepaid, on receipt of price.

The above is merely one of our many Auto Leather Necessities. Send for our Catalog A

**The W. H. Hoover Company, New Berlin, Ohio**



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Each section 2" wide 1/8" thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

HOW CAN THE RUBBER WEAR OFF IF IT IS COVERED WITH STEEL?

Try 2 or 3 sections over any old blowout

Special prices to the first in new territory

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Tire covered complete

## Guaranteed for 10,000 Miles Bricton Pneumatic Tires

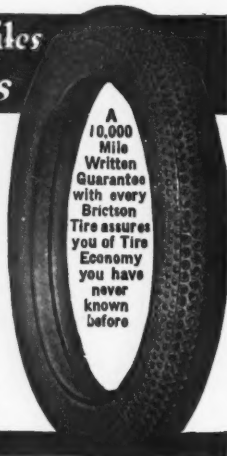
We now sell Bricton Pneumatic Tires on a specific guarantee of 10,000 miles service. Bricton Pneumatic Tires are Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim-cut-proof, Oil-proof and Gasoline-proof. A tire with wonderful resiliency and easy riding qualities.

**FREE TRIAL OFFER**—To remove any possible doubt concerning the merits of Bricton Tires and to back up our statements fully, we have a FREE TRIAL offer at our own risk. The only tire made that offers a FREE TRIAL—you can't go wrong. You risk nothing. We take all the risk. Be sure and ask for our FREE TRIAL plan when you write for particulars.

**Have Your Present Tires Rebuilt the BRICTON WAY**—if you are not in need of new tires and the fabric in your tires is still good, we can rebuild them the Bricton Way, give you thousands of miles additional service and make them Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim-cut-proof, Oil-proof and Gasoline-proof.

Write today for full particulars including details of FREE TRIAL PLAN.

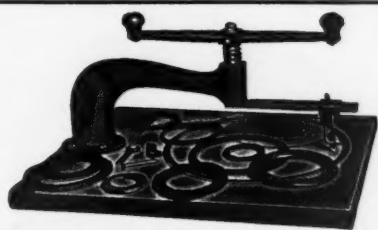
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### AXLES WHEELS PROPELLERS

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## THE SPRINGFIELD CIRCLE CUTTER

*For Cutting*

*Lamp Glass, Sheet Copper and Rubber  
Gaskets, Felt and Fiber Washers, Etc.*

Capacity any size circle  
from 0 to 14"

Positive Measuring Scale  
to determine sizes

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THE SHAWVER CO., 220 Winter Street, Springfield, Ohio

WE NOW OFFER

## The Searchlight Welder

A complete outfit for Oxy-Acetylene  
Welding

at

**\$50.00**

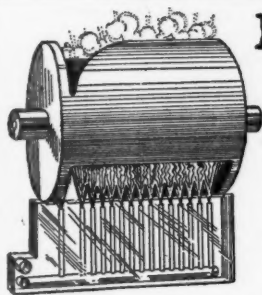
High in Quality

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**THE SEARCHLIGHT COMPANY**

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## Carbureters

1st in Grand Prix, 1st in the  
Vanderbilt on Resta's Peugeot.  
Maxwell cars in Venice Grand  
Prix, winning 1st and 2d, also  
Master equipped.

Note the wonderfully fine vapor  
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jets.

This means **UTMOST ECONOMY**,  
smooth running, together with great-  
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**CARBURETOR**  
NO MOVING PARTS  
ONLY ONE ADJUSTMENT  
WRITE FOR  
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## The Improvement in RADIATORS

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## Make Sure of Your Lights

—and your starting motor. Don't take chances of  
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**On Your Dashboard or Cowl**

will keep you posted every minute regarding electrical con-  
ditions. Its exact information is invaluable—the cheapest  
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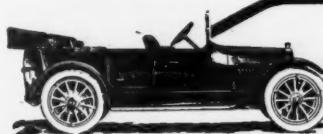
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Write for full information.

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closed car in winter—open  
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Every inch  
a car

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The Two-Door Body and Detachable  
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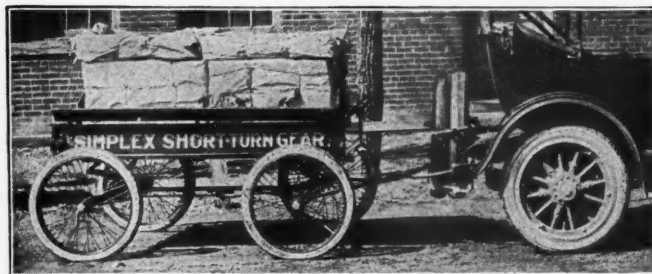
The Recognized Standard in Rubberized Cloths

Guaranteed not to leak or fade

So attractive in appearance—they help to sell the car

Send For 1915 Samples

Prices Right  
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The only automobile trailer that trails in the tracks of the automobile. Easily attached to any automobile. Light. Durable. A great convenience for milkmen, grocers, gardeners, merchants. Opens an entirely new field for the automobile dealer. Costs about 10% of the light delivery truck. The man who wants to buy a pleasure car but needs a light truck can be sold a pleasure car and a Simplex Trailer. It's a logical buy, too. Write today for complete details and liberal dealer's proposition.

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You can take a thousand miles of service out of a set of tires by driving them insufficiently inflated over ten miles of road.

Use the New Positive Lock Stop

## TWITCHELL AIR GAUGE

and save your tires



"TIRE INSURANCE FOR \$1.00"

Simple, Accurate, Durable and Easily Read

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Four floating bronze ball-valves opening automatically under different motor suction supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment

Made by the oldest manufacturers of carburetors in America  
ESTABLISHED 1895

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THERE IS MORE POWER IN  
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Dealers—Write for our attractive proposition  
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\$695

A REAL AUTOMOBILE

The lightest, strongest, most serviceable and economical machine of its kind ever built.

112 inch wheel base. Electrically started and lighted.

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The Coupelet, a luxurious two-passenger car, and the five-passenger Sedan, a roomy, stylish family car. Prices of the Ford line: Coupelet \$750, Sedan \$975, Runabout \$440, Touring Car \$490, Town Car \$690 f. o. b. Detroit fully equipped.

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TRADE MARK REGISTERED  
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Savings made please your patrons and pay good, substantial profits.

### PREST-O-LITE

**Dissolved Acetylene**  
(Ready-made carbide gas)

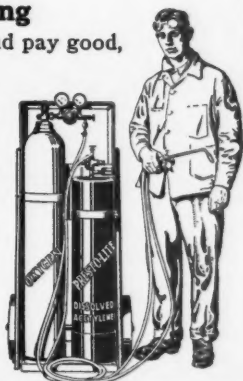
adds to the efficiency and usefulness of any good welding equipment. We furnish thoroughly high grade welding apparatus for \$60.00. The average user will also need gas cylinders at an additional cost, and about \$10.00 worth of welding supplies. Truck and special equipment for cutting operations at extra cost.

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### "Care and Repair of Tires"

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**Women Say—**  
**THE ELECTRIC GEAR SHIFT**  
makes a big gasoline car as easy  
to drive as an electric.

### The Vulcan Electric Gear Shift

is being supplied as special equipment by

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Write for booklet "Gear Shifting by Electricity"

**THE CUTLER-HAMMER MFG. CO., Milwaukee, Wis.**

**STEWART**  
**Off-on**  
**TIRE**  
**TOOL**

**Price**

**\$1.00**

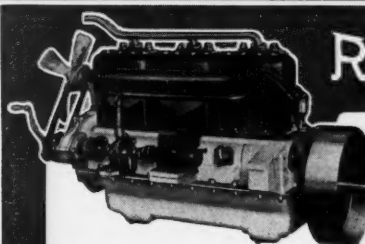
Removes and replaces the  
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minutes. For use on all  
clincher tires.

*For Sale by Dealers Everywhere*

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**THE**  
**RUTEMBER**  
**MOTOR**

*Eighty Per Cent of the  
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car depends on the per-  
formance of the motor.*

**YOU** can be cer-  
tain of **ECON-**  
**OMY** in **OPERATION** and **MAINTENANCE**, Smooth  
Running, Super-Quality and Appearance, Long Life,  
Speed, Endurance and Service when you select a car  
that carries a **RUTEMBER MOTOR**—Four or Six.

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**HORN and FAN Combined**



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No gears, motor, batteries or wires to give trouble. Gives warning signal by merely pushing button at driver's seat. Increases efficiency of fan and motor. Keeps radiator cool. Never fails to sound. Long life. Is easily interchangeable with fan on any Ford in a minute's time. Most reliable and safest horn. Write for dealer's proposition.

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**TAKES THE "JUMP AND JERK"**  
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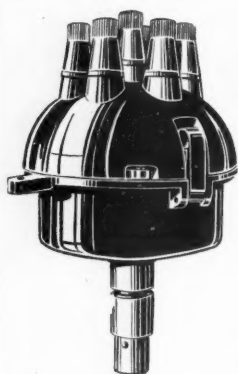
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produces a quick, hot spark, always uniform—no missing or late sparks; increases the power of your engine, economizes fuel; makes your engine start easier, run smoother, develop more power. You can go slower on high gear without danger of killing engine. Simplest Vibrator made. Only 2-1/2 inches in diameter, neat in appearance; easily installed. Sold under our guarantee of perfect satisfaction or all money refunded. Dealers will find THE CROWE a good seller at a good profit. ALL CROWE users are enthusiastic. If your dealer does not have it, write us.

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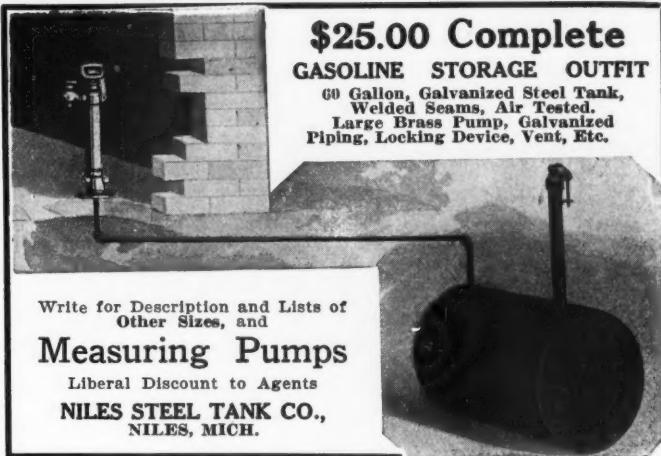
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Used by one-quarter of all 1915 U. S. A. built cars, exclusive of Fords.

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PHILADELPHIA, PA.



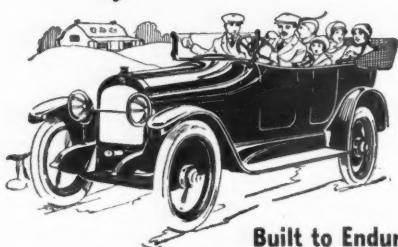
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**GASOLINE STORAGE OUTFIT**  
60 Gallon, Galvanized Steel Tank,  
Welded Seams, Air Tested.  
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Write for Description and Lists of  
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Liberal Discount to Agents  
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4 Cyl. 35 H. P.  
\$1185

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Built to Endure!

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Are easy to use and easy to sell. They are durable and efficient and are widely advertised. The cylinders are of seamless brass tubing which cannot rust. The “Stapley,” the “Aeolus,” “Windjammer,” etc., give lasting satisfaction. Carry them in stock.

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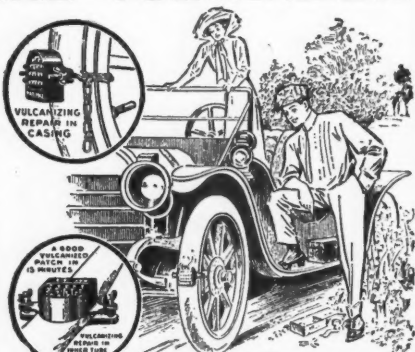
**Tire Cuts Ruin Casings**  
They admit moisture to the carcass, cause the fabric to rot and weaken, grow larger—end in blowouts. You can repair casings and inner tubes anywhere in 15 minutes, good as a repair shop can do—and for one cent.

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Ready for Instant Use. At your dealers, or we will send it prepaid. Guaranteed satisfactory or money refunded.

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Patented April 2, 1912, April 1, 1913  
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Write to-day for our  
Territorial Agreement  
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**New \$1000**  
**Inter-State**  
**“FOUR”**

The one popular priced car with  
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Hyatt Quiet Bearings are used in the majority of American made Automobiles

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For seven years the  
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**Detroit**  
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Model BX-4  
High Tension  
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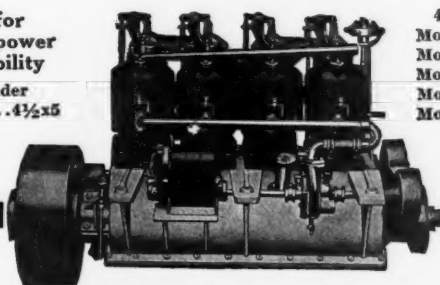


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Famous for  
silence, power  
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We build a special model adapted to Elmore and White Steam cars.  
Write us for detailed specifications.  
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## Absolutely Checks All Recoil

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## The Parker Shock Absorber

—effectively checks the recoil by maintaining a neutralizing tension between your car and the axle. It is the only shock absorber that works all the time. Absolutely guaranteed. Write for details.

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Ford \$12.50

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No tool needed to seat or remove Valve

Interchangeable with all Stems

Fifty Cents Per Dozen  
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Actual Size

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Maintains the correct lubricating body at any motor speed or heat

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(AN INDIANA CORPORATION)

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Clean out your transmission and differential—clean all the bearings and gears of grime and grease, and make sure this season of perfect lubrication, by using

TRADE MARK REGISTERED IN  
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**\$3250**

132" Wheelbase

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SYSTEM

## Electric Starting & Lighting System

It Spins the Motor

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We wish to announce that irrespective of action by any other organization **Braender Quality Will be Maintained**  
Braender Net Prices to Car Owners

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|------------|--------|-----------|------------|-----------|
| 30 x 3     | 9.00   | 10.35     | 2.35       | 2.60      |
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with one extra  
rim, complete,  
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We will allow you \$0.75 each for  
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### Auto Parts Co.

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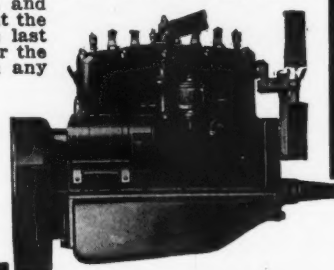
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CONSISTENT

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Link your motor to the **BIG BOY**—a big plug for big deeds. Guaranteed forever, because it's a—

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CRITERION OF ITS CLASS

Thoroughbred Six—\$1875 Famous Four—\$1375  
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All equipped with the Moore Multiple Exhaust

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CORCORAN LAMP CO.  
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Never Loses  
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Increases power; uses less gas;  
prevents carbon; saves oil.  
Wherever there's a piston ring—  
use TRUMP. Guaranteed. Write

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# The Clearing House of the Motor Car Industry

*For Second Hand Cars, Surplus Parts, Accessories, Tires, Machinery & all other Special Announcements of a Similar Character.*

**ADVERTISING RATES** 1/2 inch—One time, \$2.40. 1 inch—One time, \$4.50. 1 1/2 inches—One time, \$6.75. 2 inches—One time, \$8.75. Rates for other spaces and longer terms furnished upon request.

## CARS FOR SALE

### FOR SALE

6-cyl. 60 H. P. Norwalk Roadster, 136" wheel-base, run less than 4,000 miles; fully equipped. Price \$900. Will consider trade for small car. New or late model Ford preferred.  
**J. E. MAREK** Goodell, Iowa

### FOR SALE

1 Model 35-O late 1914 Four Passenger Mercer, painted white, fully equipped with Rudge-Whitworth Wire Wheels, two extra wheels and tires; one-man top, Jiffy Side Curtains. Has not been run 3,000 miles. Car in perfect condition. Owner buying new Mercer.

**TRENTON MOTOR CAR CO.**  
2646-48 Locust St., St. Louis, Mo.

**FOR SALE**—Pierce Arrow 6 cyl. 66 H. P., 7 passenger touring car, good condition, recently overhauled and repainted. Cost, new, \$6,000. A bargain at \$1,250. Would consider a trade for small car.  
**ADAMS & HART** Grand Rapids, Mich.

### FOR SALE

1914 38 Packard 5 Passenger in perfect condition. fully equipped.  
Price \$2200  
**TRENTON MOTOR CAR CO.,** St. Louis, Mo.

**FOR SALE**—1 used 1-ton capacity, 2 cylinder truck. 1 new 1-ton capacity 2 cylinder truck with top over all. 1 new 1,500 lb. capacity 2 cylinder top delivery. 1 remodeled Ruttenberg 4 cylinder motor 4 1/2-5 1/4. **BECK & SON, 901 W. First Ave., Cedar Rapids, Iowa.**

## GET OUR LATEST BULLETIN OF USED CARS

You will surely find one to fit your requirements. You can get from us good, serviceable machines of various makes for \$400 and up. Let our reputation be your guide.

**PACKARD MOTOR CO. OF CHICAGO**  
2367 Michigan Ave., Chicago, Ill.

Have a 40 H. P. 7-passenger, 1912 touring car with long stroke motor and 4-speed transmission which I will sacrifice. This is one of the best lively cars on the market.  
**CONDON, 2635 Wabash Ave., Calumet 5311**  
Chicago, Ill.

# Matheson

Cars and Repair Parts

**FRANK F. MATHESON, Wilkes-Barre, Pa.**

### OLDSMOBILE "54"

Five-passenger Oldsmobile 1914 Touring Car, six cylinder, electric lights and starter. Driven less than 5000 miles.  
Box 155, New Haven, Conn.

### R-C-H CARS

and complete stock of parts for all R-C-H models  
**SHELTON MOTOR SALES CO.**  
1324-26 Michigan Ave. CHICAGO

### YOUR CHOICE

OF THE BEST VALUES IN USED CARS IN CHICAGO  
Write for our used car bulletin  
**THOS. J. HAY, 2527 Michigan Ave., Chicago**

### 120 MERCEDES RACER

Special built. The right car for anyone entering Speedway, Road Work, or Exhibition work, or any present race driver who wishes to secure a car of exceptional build. Write promptly.  
**L. A. PRINCE, Sumter, S. C.**

## CARS WANTED

### RACING CAR

Suitable for dirt track work. Send specifications and details, also photo if possible.  
Address Box E 320, c/o Motor Age

## WANTED TO TRADE

Twenty Acres of Fine Fruit Land in Isle of Pines Located close to the town of Santa Fe. Land valued at \$1000, for a late model, standard make roadster, or five passenger touring car. Address

**J. W. SMITH**  
1804 Ogden Ave. Superior, Wis.

### WILL EXCHANGE

\$5,000 in CERTIFICATES OF DEPOSITS on an Atlanta Trust Company, due in one year, with interest at 4%, for race car. Address  
Box 566, Atlanta, Georgia

## GARAGES, SHOPS, ETC. FOR SALE—FOR RENT

### FOR SALE

Repair and Storage Departments of garage employing from 4 to 7 men. Located in Minnesota town of 12,000—Price \$1,400.00—Terms \$400.00 Cash—Balance—Mortgage. DO NOT apply unless you are a first class repair man with A1 references—SEND REFERENCES with inquiry.

Address Box E 313, c/o Motor Age

## HELP WANTED

### AUTO OWNERS

Save repair money, make car and tires last longer, eliminate road troubles. Our lessons will save you hundreds of dollars. Sample lessons free.  
**Franklin Institute, Dept. T 807, Rochester, N. Y.**

## WANTED

Traveling salesmen of experience for closing high-class dealer connections in Northwest, Illinois, Iowa and the East. Reliable manufacturer of popular priced car, leader of its class. State experience and give references. Only men of high calibre need apply. Postoffice Box No. 471, Detroit, Mich.

### CAPABLE OFFICE MAN

Wanted as partner in growing Auto Sheet Metal business. The investment required is small—ability for handling office end is most essential.

Address Box E 318 c/o Motor Age

### PARTNER WANTED

By auto machinist to open repair shop. Prefer established automobile agent or blacksmith with shop. Would like to hear from party with good location.

Address Box E 319, c/o Motor Age

## MACHINERY

20 MILLING MACHINES \$75.00 EACH  
Delivered to your city. Overhauling arm, overhauled, good order with countershaft. Send for photo No. 30.

**J. L. LUCAS & SON**  
3 Fox Street Bridgeport, Conn.

## MAGNETOS

### A A A MAGNETO SERVICE CO.

Selling, repairing and exchanging all makes of magnetos and coils. All types Bosch magnetos and type "A" coils bought in any condition. Agents for Marko Storage Battery.  
255 W. 57th Street New York City

### ALL MAKES OF MAGNETOS

and Coils recharged and repaired. Used Magnetos bought, sold and exchanged.  
Largest Middle West magneto repair shop.  
**EMEIS MANUFACTURING CO.**  
217-221 Iowa St. Davenport, Ia.

### Distributors and Service Station

Ward Leonard Electric Co., The Esterline Co., R. C. Wells Mfg. Co., Kemco Electric Co. Dealers and repairers of generators, starting motors, magnetos and coils. Prompt service by experienced electricians and mechanics.

### H. B. WEBER & CO.

1338 Michigan Ave. Chicago, Ill.

**Gray & Davis 1915 Starting and Lighting Systems complete for all cars, \$115.00.**

Special prices to the trade.

**PELLET'S MAGNETO EXCHANGE**

1606 Michigan Avenue  
Chicago, Illinois

## MAILING LISTS

**MAILING LISTS AND STATISTICS.** Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of electrics, trucks, Fords, Studebaker, Overland, etc. **MOTOR LIST CO. OF AMERICA,** 1107 Locust St., Des Moines, Iowa.

**NEW YORK AUTO LISTS.** Daily service covering 1915 registrations already started. Send \$10 for trial, fifteen thousand, and get my proposition on the entire state or one district.

**PETER DONNELLY**  
Box 9, Capitol Station, Albany, N. Y.

**WRITE FOR YOUR AUTO DIRECTORIES**

and Addressing Requirements to  
**Auto List and Addressing Co.**  
1737 Broadway, New York City



# The Clearing House—continued.

1915

**Auto Mailing Lists of All Lines for Sale**  
 30,370 Auto Dealers, U. S. .... \$40.00 or \$2.50 per M  
 6,200 Ford Dealers, U. S. .... 15.00 or 3.00 per M  
 19,543 Garages, U. S. .... 30.00 or 2.50 per M  
 29,924 Auto Supply Dealers,  
 U. S. .... 30.00 or 2.50 per M  
 21,983 Auto Repair Shops,  
 U. S. .... 30.00 or 2.50 per M  
 1,680,000 Auto owners. .... 2.00 per M  
 533,000 Ford owners. .... 3.00 per M  
 Have every other Auto Trade list.  
 All typewritten, showing financial rating.  
 Ask for particular territory wanted.  
**A. F. WILLIAMS, Mgr.**  
 166 W. Adams St., Chicago, Ill. Franklin 1182

## MOTORIST'S BOOKS

**A. L. DYKE'S AUTO INSTRUCTION.** A new idea of instructing you with working models to care for and repair automobiles. Simplified instruction on self-starters and lighting just added. Send for free 32-page illustrated booklet. **A. L. Dyke, Box 16, Roe Bldg., St. Louis, Mo.**

**Gas, Oil and Steam Engine Hand Book**  
 370 pages, illustrated, cloth, \$1.00. Send for complete list.  
**Charles C. Thompson Co.**  
 1130 S. Wabash Ave. Chicago, Ill.

**"THE MODERN MOTOR CAR"**  
 Just off the press. —512 pages covering all phases of the Motor Car. 470 pages on Electric Starting and Lighting. Send for sample pages.  
**LAIRD & LEE, Inc.**  
 1742 Michigan Avenue Chicago, Ill.

**THE PICTORIAL MILEAGE ROADBOOK** (California edition). Prices, \$1.50 (cloth), \$2.00 (leaving), sent prepaid anywhere. See the highways of California in actual photographs. "Every Mile a Picture," the most efficient road guide ever published. If your dealer cannot supply you, write to The Motogram Co., 915 Macdonald Ave., Richmond, Cal.

## PARTS AND ACCESSORIES FOR SALE

**A. A. A. AUTOMOBILE BATTERIES**  
 New and guaranteed 6-80 lighting batteries, \$9.50; 6-140 amp. lighting and starting batteries, \$14.50; 6-60 to 6-160, all makes, \$5 to \$15.  
**SIMPLEX BATTERY CO.**  
 120 E. 33rd Blvd. Chicago, Ill.

**AGENTS AND DEALERS**  
 We announce a reduction of from \$20.00 to \$14.00 on our Spare Demountable Wheels for the Ford. We have some good territory left. Why not handle an original line? Carry extra wheel with tire on ready and interchangeable with any of present wheels. Can install outfit at home, then change wheels in less than two minutes. Write for catalogue. Legitimate dealers, get our agency for Spare Wheels, Spring Radius Rods, Fan Belts, Radiators, Cradles, etc. **"ANGIER'S," Dept. B, Streator, Ill., U. S. A.**

**All Parts in Stock at Discount**  
 Atlas, Bergdoll, Chalmers, Ewing, Alco, Packard, Hudson, Herrshoff, etc.  
 Brown-Lipe Gear Parts.  
 Statite Rings, \$1.00 each.  
 Regular Rings, 25c each.  
**JOS. C. GOREY & CO.,**  
 354 West 50th Street, New York City

**ALL SEASON'S RECORDS MADE WITH Schebler equipment.** Why not get a Schebler Model R for your car? Our exchange proposition makes it easy.  
**J. C. NICHOLS, Direct Factory Distributor**  
 1678 Broadway New York

## AMBULANCE BODIES

Built to order. Made to fit any chassis without measurements. This is our business and we know it thoroughly.

**CHICAGO AUTO BODY CO.**  
 1627 S. Michigan Ave.  
 CHICAGO, ILLINOIS

**American Underslung and Marion**  
 Motor Car Parts and Service  
**CHARLES E. RIESS & CO., Inc.**  
 1690 Broadway, New York

## AMERICAN UNDERSLUNG PARTS AND REPAIRS

Exclusive Sales Representatives for Manufacturers who supplied Motors, Axles, Wheels, Transmission, Steering Columns, Control Levers, etc., etc., to the

**American Motors Company**  
 Write for prices on parts needed in connection with American cars.

**V. A. LONGAKER COMPANY**  
 INDIANAPOLIS, IND.

## AMERICAN UNDERSLUNG

Repair parts for all models in stock.  
 Can ship immediately.

**American Motors Parts Company**  
 831-33-35-37 E. Washington St.  
 Indianapolis Indiana

**AMPVO STORAGE BATTERIES**  
 For Starting—Lighting—Ignition  
 Factory Prices as low as \$7.50—Absolutely Guaranteed

**THE AMPVO BATTERY CO.**  
 3031 S. Michigan Ave. Chicago, Ill.

**ATLAS REPAIR PARTS**  
 We have purchased the jigs, tools, drawings of the Atlas Motor Car Co. and are the only concern supplying these parts. Write us, giving model and number. Parts shipped immediately.  
**Auto Parts & Repair Co., Springfield, Mass.**

**ATTENTION** Garages Supply Dealers Automobile Agents  
**IF YOU WISH TO SAVE MONEY IN THE PURCHASE OF YOUR AUTOMOBILE SUPPLIES.**  
 Write Postal for Bargain Bulletin 20 From the  
**MECCA MFG. & SPECIALTY CO.**  
 1743 Broadway 1208 Mich. Ave.  
 New York Chicago

## AUTOMOBILE PARTS MICHIGAN, MORA AND DRAGON PARTS IN STOCK

We maintain a complete stock of parts for the above cars.

**PHILADELPHIA MACHINE WKS.**  
 67 Laurel Street, Philadelphia, Pa.

## AUTO SALVAGE CO.

**1418 Main St. Kansas City, Mo.**  
 Buick 10, E. M. F., Flanders, Winton, Overland, and Regal 30. Parts a Specialty.  
 Motor parts and accessories for almost any make of car.

Write Us Your Needs

## AUTO SALVAGE COMPANY

**1436 Wabash Ave. Chicago, Ill.**  
 Type 10 Buick parts. 45 H. P. Stoddard-Dayton motor, \$100. 25 H. P. Oswald motor, \$75.00. Bucket seats, \$18 the pair. Oval roadster tanks, \$6.50. Splitdorf magneto and coil, \$12.50. D U 6 Dual Bosch Magneto, \$50. 20 H. P. Stoddard Dayton motor with magneto and carburetor, \$100.00. 30 H. P. British American motor with magneto and clutch, \$100.00. Brown Lipe trans., \$35.00. Timken rear axles, \$45.00.

**AUTO TOPS AND RACING SEATS**  
 Mohair Tops for runabouts, \$20.00; Mohair Tops or touring cars, \$30.00. Racing Seats, per pair, \$18.00. **AMERICAN AUTO TOP MFG. CO.,**  
 1451 W. Washington Blvd., Chicago, Ill.

**Auto Tops, Bodies and Seat Covers**  
 Hand made. We make a specialty of one man tops with jiffy curtains. Write for prices.  
**ST. LOUIS AUTO TOP CO.**  
 3029 Olive St. St. Louis, Mo.

## AXLES, WHEELS AND BODIES

New W. M. axle, front and rear, with 34x4 wheels, per set ..... \$ 65.00  
 Aluminum cone clutches..... 7.00  
 5 Pass. bodies, 33x92, not upholstered... 25.00  
 New 34x4 wheels, dem. rims, per set.... 20.00  
 New 4x5 motors with clutch 40 H. P. .... 110.00  
 Marion pressed steel frame to fit..... 15.00  
 New 4 cyl. dash coils..... 13.00  
 New Splitdorf model A magneto with coils 25.00  
 9 H. P. air cooled De Luxe motor Atwater-Kent and carburetor..... 55.00  
 Racing seats, per pair..... 22.50

Radiators for all cars. Get our price.

**K. C. AUTO PARTS COMPANY**  
 1827 Grand Ave. Kansas City, Mo.

## BALL BEARINGS REGROUND

We guarantee them as  
**GOOD AS NEW**  
 All sizes and makes in stock ready for immediate delivery—At prices that will interest you.  
**AHLBERG BEARING CO.**  
 2640 Michigan Ave., Chicago. 1790 Broadway, New York. 805 Woodward Ave., Detroit. 93 Massachusetts Ave., Boston. 1841 Euclid Ave., Cleveland, O. 325 W. Pico St., Los Angeles, Cal.

## BARGAINS In Accessories and Parts

## Now Is the Time to Buy

Carter Carburetors, 1", each.....\$ 5.00  
 Stromberg Carburetors, 1", each. 11.00  
 Stromberg Carburetor Hot Air Stoves, each..... .75  
 Storage Batteries, 8-100, each.... 10.00  
 Sight Feed Oilers, each..... .50  
 Lock Washers, per hundred..... .25  
 Steel Balls, 5/8", per hundred..... 1.32  
 2,000 Packages Carriage Bolts, Stove Bolts, Taper Pins and Machine Screws, package..... .25  
 Gasoline Tanks, 10x30 round, each ..... 4.00  
 Gasoline Tanks, 29x13x8, each... 2.00  
 Trunks, 30x14x18, each..... 6.00  
 Ford Demountable Wheels with one extra rim, per set..... 14.00  
 Carnation Wire Wheels suitable for Ford, per set of 4..... 12.00  
 32x3 1/2 wood wheels with hubs and drums, each..... 4.00  
 Wire Wheels, 33x3 1/2, set of 4.... 20.00  
 Krit Motors..... 125.00  
 Marion Motors..... 125.00

**OUR 1915 CATALOGUE IS NOW READY—SEND FOR ONE**

**AUTO PARTS CO.**  
 737 Jackson Blvd. Chicago

**Cocoa and Carpet Mats, Hand Made Seat Covers, Auto Tops Built and Repaired.**  
**AUTO CAPE TOP CO.**  
 2334 Michigan Ave. Chicago, Ill.



# The Clearing House—continued.

## BRAND NEW OVERLAND BODIES

Model 79 Overland touring bodies complete with top and wind shield.

## BIG SACRIFICE

**OVERLAND MOTOR COMPANY**  
2426 Michigan Avenue Chicago, Ill.

### BUICK DEALERS

We carry all models of Buick radiators in stock, in both Honeycomb and in and Tube constructions. Every radiator new, built right from the ground up. Write us for particulars. We will save you money.

**DETROIT RADIATOR & SPECIALTY CO.**  
963 Woodward Ave., Detroit, Mich.

### CUT PRICES

Send for our illustrated cut price auto supply catalogue.  
**Liberty Tire & Supply Co.**  
98 Chambers St. New York, N. Y.

### F. & H. WIRE WHEELS

Equipped with F. & H. Special Wire Wheel Rims. Adaptable to any car. Complete equipment for Ford cars.

**THE F. & H. WIRE WHEEL CO.**  
Springfield, O.

### FORD CAR BODIES

Commercial bodies guaranteed to fit Model "T" Ford. Bucket seats not painted or trimmed, \$5.00 per pair. Trimmed and upholstered backs and cushions, \$15.00 per pair. We also build a full line of Speedster bodies complete; also Ambulance and Undertakers' cars, all for Ford chassis. Send for our catalog. Agents wanted everywhere.

**COLUMBIA BODY CO., OF DETROIT**  
21-23 Selden Ave. Detroit, Mich.

**Ford Cut-outs**—Ford cut-outs, with brass lock open pedal, complete, \$1.15; with enameled pedal, \$1.00.

**Brass Hammers**—Polished brass hammer with handle, weight 1 lb., price \$0.65.

**Brass for Bushings**—Cored brass for bushings, all sizes. Write for prices.

Lincoln Machine Shops, Lincoln, Ill.

### FORD DEALERS

Get our proposition on our special "More Speed for the Ford" Gears and on Ford Honeycomb and Fin & Tube radiators. It will be worth your while.

**DETROIT RADIATOR & SPECIALTY CO.**  
963 Woodward Ave., Detroit, Mich.

### FORD JITNEY BUS BODIES

We have the only practical Bus Body on the market. Our price is a revelation. Get full particulars.

**LONDON AUTO SUPPLY CO.**  
2548 Wabash Ave. Chicago

### FORD OWNERS

Send at once for our 1915 Cut Price Ford Specialty Catalogue.

**HARRY M. SMITH**  
253-255 Madison St. Passaic, N. J.

**FORD-TOWNMAN VALVE ADJUSTERS and SILENCERS.** The only valve silencer made. The only adjuster that fits without filing or grinding off valve stems. A time saver. Accept no substitute. Your jobber or Townman Auto Spec. Co., 822 Western Ave., Minneapolis, Minn.

### FORE DOORS

Made for all old cars without the doors. We have all patterns. Just give us the name of your car.  
**CHICAGO AUTO BODY CO.,** Chicago, Ill.

### FOR SALE AT A BARGAIN

New 5x6 four-cylinder, governor-controlled engine, fully equipped, with carburetor, magneto. Will sell for much less than cost. **FRED HANSON, 570 Prior Ave., St. Paul, Minn.**

### GARAGE OWNERS

There are good profits to be made handling our line of Ford Delivery Bodies; twenty styles to select from; write us for list and discounts. **WE ARE FORD COMMERCIAL CAR AGENTS HAYES-DIEFENDERFER CO.**  
21 W. 62nd St. N. Y. City

### GOGGLES

**NEW ERA** are the best. Dealers and Garages send for our 1915 catalog. A big line of real money makers. **NEW ERA OPTICAL CO., The Advertising Bldg., Chicago.**

## HUPP DEALERS

Get our proposition on Honeycomb Hupp "20" radiators

**DETROIT RADIATOR & SPECIALTY CO.**  
963 Woodward Ave. Detroit, Mich.

### Jitney Bus and Commercial Bodies

For Any Ford Chassis  
Write for prices and catalogue. Special Bodies for any chassis built to order.  
**A. J. MONDAY CO.**  
4th & Prairie Sts. Milwaukee, Wis., U. S. A.

### Jitney Bus Bodies for Ford Cars

Write for photo and prices  
Truck and Delivery Bodies to Order  
**BURLEIGH BODY WORKS, Kalamazoo, Mich.**

# K R I T

## Will Be Continued

The recent auction sale at the Krit plant was for the purpose of disposing of all obsolete material and surplus production stock. No items of any kind were sold that will be needed by us in maintaining the Service Department for Krit dealers and owners.

The Service Department will be continued on a better and more satisfactory basis than ever before. The auction sale in no way affects the continuation of the business of the Service Department.

The Krit Motor Car Company is here to stay and you may absolutely depend upon getting prompt and accurate shipment of all parts just as long as there is a Krit car running.

Address all mail the same as always—to the Krit Motor Car Company, Detroit, Michigan.

**Krit Motor Car Company**  
Detroit, Michigan

# IMPORTANT

purchases have been made recently of several large concerns from bankruptcy courts, and we are now able to sell automobile accessories and parts even cheaper than heretofore.

We can now furnish parts for almost sixty makes of motor cars, no longer manufactured.

## SPECIAL PRICES

### Auxiliary Seats

Per pair .....\$ 15.00

### Axles

Front axles (many makes and sizes) \$10.00 and up  
Rear axles ..... 25.00 and up

### Bodies

Many models .....\$10.00 and up

### Deaco

Starting and Lighting Outfits  
For Ford cars, complete with two head lamps, tail lamp, battery, cutout, switch, wiring, etc. ....\$ 55.00  
We also have Deaco outfits for other cars.

### Fenders

Fenders .....\$ 3.00

### Garages

**PURITAN Permanent Portable Garage**  
10x14 wood.....\$ 62.50  
10x18 wood..... 75.00  
10x16 all steel..... 135.00

### Gasoline Tanks

Oval 11x30x15.....\$ 4.50  
Round 12x30 ..... 2.50  
Square—many sizes..... 1.00

### Magnetos

All makes .....\$8.00 and up  
Magneto coils..... 6.00 and up

### Radiators

E. M. F. (all models).....\$ 22.75  
Hudson 20—honeycomb..... 24.50  
Oakland 42 (V-shape)..... 30.00

### For Ford Cars

Model T honeycomb—new..... 17.00  
Model T honeycomb (V-shape) brass—  
new ..... 23.00  
Model T honeycomb (V-shape) nickel—  
new ..... 25.00  
A long starting crank is furnished with V-shape radiators for Fords.

### Spark Plugs

Spark plugs......6 for \$ 1.00

### Steering Gears

Jacox .....\$ 7.50  
Gemmer ..... 15.00

### Tops

For Ford cars—roadster.....\$ 11.50  
For Ford cars—touring..... 15.00  
(Complete with side curtains and boot).  
We have tops for most every make of car  
at .....\$10.00 and up

### Transmissions

Sliding gear, 3 speeds ahead and 1 reverse,  
complete with control levers.....\$ 40.00

Write at once for a copy of our new Spring catalogue

## Puritan Machine Co.

**ALFRED O. DUNK, Pres.**  
410 Lafayette Blvd., Detroit, U. S. A.  
ALL PARTS FOR ALL CARS

# The Clearing House—continued.

## K-R-I-T OWNERS

You can now get quick service on original REPAIR PARTS at same old prices.

### Puritan Machine Co.

ALFRED O. DUNK, Pres.

410 Lafayette Blvd., Detroit

All Parts for All Cars

### Lozier Repair Parts

We have on hand repair parts for Lozier Cars at reduced prices. Send old parts for replacement.

Philadelphia Machine Works  
67-71 Laurel St., Philadelphia

### MAXWELL OWNERS AND REPAIRMEN

Why pay 20% advance for your repair parts for the old models of MAXWELL cars? We can supply 90% of your wants at the old list price. Transmission gears and parts in stock for Cadillac, Case, Croxton, Dorris, Elmore, Mellins, Moyer, Overland, Regal, Selden, Stoddard, Velle and 75 others at cut prices. Why pay more? Send for price list.

M. P. SUPPLY COMPANY  
Atlanta, Georgia

### MONEY SAVING BARGAINS

|   |          |
|---|----------|
| New 1915 Ford Touring Car Bodies, early model .....                       | \$ 80.00 |
| New 1915 Ford Touring Car Bodies, late model with cowl .....              | 110.00   |
| New 1915 Ford Roadster Bodies, early model .....                          | 40.00    |
| New 1915 Ford Roadster Bodies, late model .....                           | 60.00    |
| Complete with Top, Curtains, Cushions, Floor Boards, and Windshield ..... |          |
| Full B Prest-O-Lite Tanks .....   | \$10.00  |
| Windshields, any size .....   | 6.00     |
| Regular Ford Windshields, new .....                                       | 6.50     |
| Stewart Model 100 Speedometers .....                                      | 6.00     |
| Stewart Model 102 Speedometers .....                                      | 7.50     |

### ERWIN GREER AUTOMOBILE CO.

Ford Accessory Dept.

1519-21 Wabash Ave. Chicago

### MORE SPEED FOR THE FORD

Special Ratio Differential Ring Gear and Drive Pinion for the Ford. Either 2 4/7 to 1 or 3 to 1 ratio.

More speed with maximum power at a decreased cost in gasoline and oil consumption is the result obtained by using either of these ratios, because they prevent the "racing of the motor" which is necessary with the regular Ford ratio (3.63-1) to make time.

EITHER RATIO \$15.00 PER SET

We also furnish a 4-1 ratio for use on Ford light delivery cars or for very hilly or heavy sand country travel.

Detroit Radiator & Specialty Co.

963 Woodward Ave. Detroit, Mich.

## Modernize Your Car

Bring your car up to date. Write for our Bulletins. They will show you how to save \$\$

### A Few Samples :

#### RADIATORS

|  |         |
|--|---------|
| Ford "V" shape, honeycomb .....        | \$23.50 |
| Ford straight front honeycomb .....    | 18.50   |
| Chevrolet "V" shape, 6 cyl. ....       | 20.50   |
| Oakland "V" shape, nickel finish ..... | 22.00   |
| Hupp "20," honeycomb .....             | 25.00   |
| Buicks—all models .....                |         |

#### TOPS

|   |       |
|---|-------|
| Ford touring car, complete with curtains and top boot ..... | 16.00 |
| Ford roadster tops, complete .....                          | 12.00 |
| Maxwell "25," less curtains .....                           | 6.00  |

#### WHEELS

|  |       |
|--|-------|
| New wheels with demountable rims for all cars .....  |       |
| New Wheels with demountable rims for Ford and Maxwell cars, complete with extra rim, per set ..... | 18.00 |
| We allow \$1.00 each for old wheels.   |       |
| 34x4 and 4 1/4 Q. D. wheels .....  | 2.00  |
| 30x3 1/2 Q. D. Wheels .....  | 2.00  |
| 30x3 New Ford wheels .....   | 1.50  |
| 30x3 1/2 New Ford wheels .....   | 2.00  |
| 30x3 1/2 Regular Maxwell wheels .....  | 2.00  |

#### MISCELLANEOUS

|   |       |
|---|-------|
| Jacox steering gear, complete with 18" wheel .....              | 10.00 |
| 18" Steering wheels with aluminum spider .....                  | 2.50  |
| 16" Steering wheels .....                                       | 1.50  |
| 1" Kingston carburetors for Fords .....                         | 2.50  |
| 1 1/4 Marvel carburetors .....                                  | 3.00  |
| 1" Holly carburetors complete with hot air pipe and stove ..... | 3.00  |
| 1 1/4" Model "L" Schebler carburetors .....                     | 11.00 |
| Guaranteed spark plugs, 12 for .....                            | 1.80  |
| 2 1/4" Spring clips, per dozen .....                            | .50   |
| 30x3 New (guaranteed firsts) clincher casings .....             | 7.00  |

#### FORD CROWN FENDERS

|                                   |       |
|-----------------------------------|-------|
| Set of four, enameled black ..... | 12.00 |
|-----------------------------------|-------|

#### FORD RING GEAR AND PINIONS

|  |       |
|--|-------|
| Ring gear .....                                  | 3.75  |
| Pinion .....                                     | 1.25  |
| \$35.00 type shock absorbers for heavy car ..... | 10.00 |
| Ford Shock absorbers .....                       | 4.50  |

#### THOUSANDS OF OTHER BARGAINS

### Automobile Specialty Company

999 Woodward Avenue  
DETROIT, MICH.

### MOTOR CAR OWNERS

Remove carbon with The Cowdin Carbon Remover, price 65c. We also manufacture and guarantee the Leak-No-More Radiator Compound which prevents Radiators from leaking, price 60c. From your dealer, or we will ship prepaid on receipt of price.

Delphi Auto Specialty Co.  
DELPHI, INDIANA

### NEW DESIGN RACING SEATS

Write for Catalogue

CHICAGO AUTO EQUIPMENT CO.  
319 So. Jefferson St. CHICAGO

### NEW 1915 FORD ROADSTER BODIES

These bodies include new cowl, top, cushions, side curtains, slip cover, floor boards, rubber mat, dash and hood support, windshield, rear round fenders and fenders, 2 side lamps and tail lamp. Complete \$65.00 f. o. b. Detroit, crated. Fit any Ford chassis from 1912 up.

JOHN C. NAGEL  
425-23 Baker St. Detroit, Mich.

## NO MATTER WHAT CAR

You own or may buy, our large distributing warehouses are ready to make immediate delivery to you of any repair parts that are necessary to place your car in perfect running order.

## We Have All Service Parts

and because of this assurance, the fear of inability to buy parts for orphan or second-hand cars has been swept aside. We are located in Detroit, the heart of the automobile industry, and are able to offer our customers extraordinary values at the lowest prices. We carry everything from the smallest screw and bolt to the complete automobile.

### WRITE OR TELEGRAPH

Our Service Department is the most efficient in the world. We make prompt and immediate delivery.

### Puritan Machine Co.

A. O. DUNK, President,  
410 Lafayette Boulevard Detroit  
ALL PARTS FOR ALL CARS

### ONE MINUTE FORD TIRE TOOL

This tool will positively completely change a Ford clincher tire in one minute without labor. Postpaid for \$1.00. Dealers, send for circular and dozen price.  
HEYNS BAZAAR Detroit, Mich.



# The Clearing House—continued.

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Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

**Arsenal Varnish Company**  
Auto Dept. Rock Island, Ill.

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Lap joints, ground finish, individually cast, at 25c each. Triple rings for more compression and economy of fuel at 90c each. **Grossman Auto Parts Company, White Plains, N. Y.**

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Bucket Seats

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|                                       |         |
|---------------------------------------|---------|
| Ford Model T Tubular.....             | \$16.00 |
| Ford Model T Honeycomb, V-shaped..... | 25.00   |
| Bulck 16 and 17.....                  | 28.50   |
| Bulck 10.....                         | 20.00   |
| Hudson 20, 32 and 33.....             | 28.50   |
| Chalmers 30.....                      | 30.00   |
| Everett 30 Tubular.....               | 14.00   |

Write for prices on any other makes

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1436-38 S. Michigan Ave., Chicago, Ill.

### Radiator Bargain

in Studebaker Radiators

We have a quantity of radiators for Studebaker cars on hand, and offer them for immediate sale at an exceptionally low cash price.

Every one is a new Fin and Tube radiator, guaranteed to fit.

|                    |         |
|--------------------|---------|
| Studebaker 35..... | \$23.50 |
| E. M. F. 30.....   | 23.50   |
| Studebaker 25..... | 19.50   |

Send in your check now—They won't last long

**Detroit Radiator & Specialty Co.**  
963 Woodward Ave. Detroit, Mich.

## RADIATORS

**NEW GUARANTEED**

|                     |                     |         |         |
|---------------------|---------------------|---------|---------|
| Ford T.....         | Tubular. Honeycomb. | \$17.00 | \$19.50 |
| Bulck 10.....       |                     | 19.75   | 22.50   |
| Hudsons, 20-33..... |                     | 29.00   | 29.00   |
| Overlands.....      |                     | 31.00   | 33.00   |

We have radiators, both tubular and honeycomb, to fit any car. Write us for prices before buying. Send in your old radiator for repairs. We are experts. We'll make allowances on your old radiator.

### WORLD'S LARGEST DEALERS

in automobiles and accessories. Send for the great

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the money saver, covering everything pertaining to an auto.

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To charge from A. C. circuit, 1 to 8 ignition, lighting or starting batteries at one time; \$12 and upwards. **AMERICAN BATTERY CO., 1124 Fulton St., Chicago.**

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Krit, Car-Nation, Keeton, F. A. L., Elmore, Deal, Midland, American, Henderson furnished. We also build and repair radiators, cylinders, crank shafts, etc.

### AUTO PARTS COMPANY

737 Jackson Blvd. Chicago, Ill.

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A leather covered sable robe rail; detachable ends; no more stuffing robe or coat. Dealers' discount. Write to

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For Automobiles are rapidly becoming a necessity. Dealers are enthusiastic over our proposition.

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**SHIP THAT TROUBLESOME CARBURETOR** by Parcel Post. We rebuild and install new parts. Factory testing methods used. Service Station for Rayfield, Schebler, Stromberg and Holley. All work guaranteed. **Wills, Carburetor Specialist, 358-360 Belleville Ave., Newark, N. J.**

## STARTLING AUTO

AND

## AUTO ACCESSORIES REDUCTIONS

THE DEMAND FOR A HIGH GRADE AUTOMOBILE AT A MODERATE PRICE IS GREATER THAN EVER.

OUR POSITION IN THE AUTOMOBILE INDUSTRY IS SUCH THAT WE ARE ABLE TO SELL AT ALL TIMES LOWER THAN ANYWHERE ELSE.

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SEE THE 250 CARS ON OUR FLOORS BEFORE DECIDING

New 5 pass. touring cars, electric light and self-starter, fully equipped; reg. price, \$1,500; our price, \$810. New 5 and 7 pass. touring, fully equipped; list price, \$1,750; special job, \$545. **NEW KING ROADSTERS;** regular price, \$1,500; our price, \$690. New Sampson delivery trucks, with express body, \$495.

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New Herschel-Spillman Motors, 4 and 6 cylinder, \$275; other motors, \$65 up. \$300 fore-door touring bodies now \$85. Runabout bodies 1914 Ford, new \$35; others \$40 and \$50. Runabout tops, \$15; touring, \$25 (measurement blank sent on request); Racing Seats, \$10 each; Spicer Universal joints, \$4 each; mechanical oilers, \$4 up; windshields, \$5 up; Special nickel 1 piece Rain-vision shield, \$10; Disco self-starter, \$5; Remy complete dual system magnetos, Model R. L. and R. D., \$25; others, \$5 up; Rayfield, Stromberg and Schebler carburetors, \$5 up; gloves, \$1 up; double plush robes, \$3.50 each. Bulb horns, 75c; electric horns, complete with wire and button, \$1.95; hand horns (mechanical), \$1.50; exhaust horns (all sizes), \$2.50; spark plug pumps, \$5; double action pumps, \$1.75.

### SPARK PLUGS

Special, 5 for \$1; Mosler, 4 for \$1; Timesco, 3 for \$1; Bearings all \$1 up to \$5.

Send for our latest USED CAR LIST, and the supply PRICE WRECKER—it's free.

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World's Largest Dealers

1210 Michigan Ave., Chicago  
S. W. Cor. 56th St. & Broadway, N. Y.

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Saves Gasoline and Oil—Increased Compression. Used in all Engines—Write for circular. **W. V. SMITH, Sole Manufacturer and Patentee, 421 Ave. A, Schenectady, N. Y.**

## SNAPS FROM RECENT BIG DEALS FOR QUICK BUYERS

10,000 storage tanks, 50-10,000 gallons capacity. 7,500 tool kits for Fords and larger cars. Lathes, Drill Presses and all other small and large machine tools. Equipment of every kind for garage owners and repair men. Write for complete list of snaps. No. MB-140.

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Owners Chicago House Wrecking Company  
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Parts Repaired and Furnished for any Speedometer  
The ONLY Known Concern Repairing Broken Speedometer Shafts; any make repaired.  
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## Sure-Go Ford Fan Belt

Made of web and leather. Web on outside prevents stretching leather on inside. Makes smooth wearing surfaces. Ask the dealer, or send us 50c for sample.

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LINCOLN, NEBRASKA  
Manufacturers

### "THICK-O GUM SHELLAC"

Absolutely pure Orange Shellac (no rosin), cut very thick and heavy in denatured grain alcohol, put up in double friction top cans. One doz., ½ pint, \$1.30, you pay charges. One doz., ¼ pint, 90c, you pay charges.  
**THINK OF IT—Shellac positively guaranteed to be cut at rate of six pounds to a gallon.**

**Princeton Sealing Wax Co.**  
PRINCETON, ILLINOIS

## We Tear 'Em Up and Sell the Pieces

We Can Save You Money on Repair Parts or Supplies for Your Auto

We also buy old autos—condition no object—or any part of an auto, or if you want to trade parts we will trade with you

### MOTORS

|   |                    |
|---|--------------------|
| Empire 1912, 20 H. P.....                     | \$ 75.00           |
| Bergdoll 1913, 30 H. P. Unit Power Plant..... | 150.00             |
| Jackson 1910, 40 H. P. Unit Power Plant.....  | 150.00             |
| 2 Cyl. Motors.....                            | \$25.00 to \$50.00 |
| Flanders 20 H. P., 3 speed.....               | 75.00              |
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Can supply you with Crank Cases, Crank Shafts, Cam Shafts, Cylinders, Pistons, connecting Rods, Radiators, Gears (any style), Timers, Magnetos, Coils, Carburetors, Manifolds, Water Pumps, Transmissions, Rear and Front Axles, Wheels, Steering Gears (complete), Steering Wheels, Gasoline Tanks, Wind Shields, Springs, Bodies, Seats and Cushions, Jacks, Tires and Tubes, Head Lamps, Side Lamps and Tail Lamps (any style), Prest-O-Lite and Search Light Tanks, Horns, Mufflers—in fact, any part of an auto.

OUR GUARANTEE TO ALL—IF NOT SATISFIED WITH YOUR BARGAIN, RETURN AND WE WILL REFUND YOUR MONEY.

## AUTO WRECKING CO.

Old Church, 13th and Oak  
KANSAS CITY, MO.



# The Clearing House—continued.

**VULCANIZER, SLIGHTLY USED**  
AS GOOD AS NEW. FOR SHOP USE.  
A GREAT BARGAIN  
**Vanderpool's, Springfield, Ohio**

**WHEELS** For any car or Truck. New  
FORD Wheels with 30x3½  
Clincher rims, \$2.45 each, net.

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**50c THE ECONOMY 50c**  
Automatic Auto Jack lifts all four wheels off the floor, saves tires and has only four moving parts; so simple a 15-year-old boy can make one. Complete instructions and blueprint sent for 50c. Why pay more when this Jack can be made in a few hours' time.

Write to the  
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**BOWSER LUBRICATING OIL TANK**  
One bbl. capacity, also Crank Case for 1910 Model 42 Oldsmobile. State lowest prices.  
Address Box E 321, c/o Motor Age

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### PROTECT YOUR IDEAS

Send for free book and free search plan.

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Established 1864. Main office, Washington

## RADIATOR & LAMP REPAIRING

**ALL OUR RADIATOR REPAIRING GUARANTEED.** New Radiators, Hoods, Fenders, Tanks and New Cores installed in old radiators at bargain prices.

**ILLINOIS AUTO SHEET METAL WORKS**  
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**A New Radiator or Your Old One** repaired. Repairs in one day—a new radiator in two days. We are specialists also on fenders, hoods, gas tanks, lamps, and all auto sheet metal work.

**WABASH AUTO RADIATOR MFG. CO.**  
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**AUTO RADIATORS MANUFACTURED FOR ANY CAR—SHIPPED IN 3 DAYS**

We fit new cores or any part in any radiator  
**LEAKING AND SMASHED RADIATORS**

Repaired and returned promptly  
Also make hoods, fenders and tanks  
All Work Guaranteed

**SHEPPARD MANUFACTURING CO.**  
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## CHICAGO MFG. CO.

1466 Michigan Avenue, Chicago

We are the only radiator manufacturers in Chicago making a square tube radiator. New guaranteed cores placed in old radiators. We also manufacture Hoods, Fenders, Tanks and Pans and do guaranteed repair work. Prompt service.

## ONLY RADIATOR FACTORY IN NORTHWEST

Pioneer manufacturer. Why send your radiator down east when you can ship it to us, save time, expense, freight, money, and get best workmanship. Prices right. Make new radiators, allow for old one.

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## W(RIGHT) RADIATORS

Have stood the test of years—most durable and efficient. Get the best at less cost than others. Don't order until you send for our prices, and illustration of construction. Honeycomb and Bridge Fin Types (tubular). All standard makes in stock. Exceptionally low price on Fords. Dealers' discount.

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**A. A. A. SCORED CYLINDERS**  
Repaired by electricity. Filled with silver composition. Same piston and rings used. No warping of cylinders. Also welding.  
**L. LAWRENCE & CO.**  
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Everready Automatic Engine Starter. General machine work for foreign and American cars. Welding of all metals. Manufacturer Catelain Hose Coupling.  
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## CYLINDER GRINDING

on automatic machinery by skilled mechanics at prices that will interest you. Gears, axles, valves and parts of all kinds made of high grade alloy steel. Send us your worn or broken parts and we will replace them.

Oxy-Acetylene Welding  
of cracked cylinders a specialty  
**ADAPT MACHINERY CO.**  
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## Cylinders Rebored and Ground

Fitted with my light pistons and McCadden Leakless Rings.

I produce a cast iron piston weighing as low as 2 pounds for a 4-inch. Every job sent out is from 25 to 40% lighter than factory. Result: Absence of vibration, higher speed, more power. Also put in new pins and bushings. Every piece finished on grinders by micrometer to mirror finish.

**MCCADDEN MACHINE WORKS**  
ST. CLOUD, MINN.

## CYLINDERS REBORED

Including new pistons and rings, \$7 to \$11 per cylinder. General overhauling and repairing.

**Welding**  
Cylinders, Crank Cases, and Crank Shafts Welded.

**STERLING ENGINE COMPANY**  
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**Cranks, Crankcases, Connecting Rods, pistons, scored cylinders** made equal to new with our New Silver Iron process—use the same piston and rings.

**POWELL-ELLIOTT AUTO REPAIR CO.**  
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## CYLINDER REGRINDING

Including New Pistons and Rings. All makes, \$5.00 per Cylinder. Write

**NEUPERT MANUFACTURING CO.**  
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## CYLINDERS REGROUND

and fitted with Special Composition heat-treated rings and heat-treated pistons, \$7.00 to \$15.00 per cylinder. Ford cylinders reground and fitted with Standard weight pistons, \$18.00. Special light pistons, \$24.00. Oxy-acetylene Welding.

**BERNHARD & TURNER AUTO CO.**  
Des Moines, Iowa

## CYLINDERS REGROUND

Including new pistons and rings for \$5 to \$11 per cylinder. We do this class of work exclusively and are thus able to give you the highest class of work at these prices. Ford cylinders reground, including new pistons, rings and wrist-pins, for \$20.00.

**THE CROWN MACHINE SHOP**  
Crown Point, Ind.

## LEE W. OLDFIELD

Minneapolis, Minnesota  
Extra light reciprocating parts and accurate cylinder grinding my specialty.

## "MORE COMPRESSION"

15 to 20% more compression guaranteed on all used cars, giving the same results as having cylinders reground with new rings fitted. This compound is made from a very high fire test mineral oil, and put up in a liquid form in sealed cans. One can is sufficient for 5,000 miles. "More Compression" is a carefully prepared product—prepared so that it can be turned into the crank case and contains a filler that can not be burnt and yet it will lubricate with less friction than any oil.

As "More Compression" is a time and money saving proposition, it can be readily appreciated by those having such trouble, as oil working up into the firing chamber causing carbon deposits, and oily spark-plugs, which will cause misfiring.

"More Compression" lubricates and also adheres to the walls of the cylinders, filling any grooves or scores in the metal which would let the power escape.

Price \$1.00 a can and satisfaction guaranteed  
Manufactured by  
**F. R. BURBUSH** Granville, Mass.

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**M. L. UDWIN CO.**  
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Telephone Harrison 4848

**Restore the Power and Snap of Your motor** by having the cylinders reground, new pistons and rings \$7 to \$11 per cylinder. Ford cylinders reground, new pistons and rings \$15 per set. Oxy-Acetylene Welding. Work guaranteed.

Established 1897  
**BUTLER MFG. CO., Knightstown, Ind.**

**The Baxill and Bruel Portable Automobile Cylinder Grinder** is a big money maker. Should be in every garage and service station. Write today for descriptive circular and prices.

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### WE REGRIND CYLINDERS

Furnish our heat treated piston rings and pistons. First class equipment, 15 years' experience. Write for our prices.

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**FREE BOOKLET—"How to Succeed in the Automobile Business,"** on application. \$40.000 equipment—eight instructors—actual work, repairing and driving—Day and evening classes.

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**Automobiles Boxed for Export**  
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Trucking and Storage. Automobiles and Bodies Stored. Automobiles boxed for export.  
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# The Clearing House-continued.

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**Engineer Successful in Designing**  
motor trucks and pleasure cars will be open for  
engagement April 1st. References as to char-  
acter and ability.

Box E 308, c/o Motor Age

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### ANNUAL TIRE SALE

In Guaranteed and Used Tires

| Size     | Used      | New     | Size     | Used       | New     |
|----------|-----------|---------|----------|------------|---------|
| 30x3     | ...\$4.50 | \$ 6.00 | 34x4     | ...\$ 9.00 | \$12.90 |
| 30x3 1/2 | ... 6.00  | 7.80    | 34x4 1/2 | ... 10.00  | 17.60   |
| 32x3 1/2 | ... 7.00  | 8.75    | 36x4 1/2 | ... 11.00  | 17.90   |
| 33x4     | ... 9.00  | 11.85   | 37x5     | ... 12.00  | 21.00   |

10% deposit with order. Balance C. O. D. subject  
to examination.

**ACME TIRE AND REPAIR CO.**  
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### AUTO TIRES!!

Tough tread tires. They average 5000 miles  
service. 30-3, \$6.50; 30-3 1/2, \$8.25; 32, \$8.35; 33-4,  
\$11.50; 34, \$12.00; 36, \$12.00. All other sizes.  
Skids 10% additional. For 4000 mile guaran-  
tee add 10%. No money in advance.

**TIRE SALES COMPANY,** Buffalo, N. Y.

## DOUBLE TREAD YOUR OLD TIRES

Why not reclaim your old worn out or rim cut  
tires and have from

**2,000 to 5,000 MILES MORE USAGE?**

Send me two old tires, one with a good bead,  
the rubber could be all worn off, and the other  
with a good tread but can be all rim cut or  
blown out on the side, and we will combine them  
into a sound one by our

### Double Tread Reclaiming System

For a cost of from \$2.00 to \$4.00

If you have only one tire in this shape we can  
furnish you with the other one at a cost of  
from \$4.00 to \$9.00. If you have no old tires  
to have remade you can purchase ready remade  
ones that we carry in stock. All sizes, from  
\$4.00 to \$12.00.

| Size     | Plain      | Non     | Size     | Plain      | Non     |
|----------|------------|---------|----------|------------|---------|
| 30x3     | ...\$ 5.00 | \$ 5.50 | 30x4 1/2 | ...\$11.00 | \$12.00 |
| 30x3 1/2 | ... 6.00   | 7.00    | 34x3 1/2 | ... 7.00   | 8.00    |
| 37x5     | ... 11.00  | 12.00   | 32x3 1/2 | ... 7.00   | 8.00    |

For other sizes get our complete price list

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Double Tread Tire Expert

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Open Day and Night

Branch: 5904 Central Ave., Cleveland, O.  
We pay express charges on receiving your old  
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### WHY YOUR TIRES BLOW OUT

Do You Know? Are You Sure?  
This information mailed free. Send tire sizes,  
name and address to

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## TIRE BILLS CUT IN HALF

We guarantee you 2000 additional miles  
out of your old casings. Send us two old  
tires, and we return them as one ready  
for hard service. We are saving thou-  
sands of motorists money by our reclaim  
system.

Write us today

### COWANS BROS.

150 W. 55th St., N. Y. City

### TIRES—Guaranteed 3500 Miles Heavy Car Type

|          |            |          |            |          |            |
|----------|------------|----------|------------|----------|------------|
| 30x3     | ...\$ 7.60 | 32x3 1/2 | ...\$11.05 | 34x4     | ...\$16.05 |
| 30x3 1/2 | ... 10.15  | 33x4     | ... 15.70  | 35x4 1/2 | ... 22.20  |

Deduct 10% and send cash with order

Other sizes in proportion

**Consumers Tire Co., Indianapolis, Ind.**

### TIRES TIRES ALL FRESH SELECTED SECONDS

|          |            |          |            |
|----------|------------|----------|------------|
| 30x3     | ...\$ 6.00 | 34x4     | ...\$12.90 |
| 30x3 1/2 | ... 7.90   | 35x4 1/2 | ... 17.90  |
| 32x3 1/2 | ... 8.65   | 36x4 1/2 | ... 18.25  |
| 33x4     | ... 12.00  | 37x5     | ... 21.00  |

All other sizes in Stock. Non-Skid 10% extra.

All orders C. O. D. on APPROVAL.

### TIRE SUPPLY COMPANY

1101 Hennepin Ave. Minneapolis, Minn.  
Take advantage of present low prices.

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### AGENTS WANTED

To solicit Nickel Plating of Automobiles, etc.  
Big commissions.

**Nelson Plating Co.** Morris, Ill.

**WANTED—State or county agents to sell Groll**  
Ford Auto Starters. Ford dealers and owners  
doing big business with the GROLL. The best  
mechanical starter ever invented.

### THE BUCKEYE AUTO STARTER CO.

57 W. Main St. Deshler, Ohio

### EXCLUSIVE TERRITORY GIVEN TO GOOD AGENTS AND DEALERS

Liberal commission for sale of

### CARBON-NOT

The best Carbon Remover on the market.  
Write for particulars

### CARBON-NOT SALES CO.

N. Y. American Bldg., Broadway and 58th St.  
NEW YORK CITY

## WANTED

Salesmen calling on the Ford trade to handle  
new line of Ford specialties. Goods guaranteed.  
Liberal commission to hustlers

**W. S. GRAFFAM & CO., Northampton, Mass.**

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### AA1 WELDING OF ALL METALS

Cast Iron and Aluminum a Specialty  
**ADVANCE WELDING MACHINE COMPANY**  
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Phones: Monroe 3937; Auto. 36-192. Chicago, Ill.

### AUTOGENOUS WELDING

Expert welders on automobile parts. Manufac-  
turer of the Galbraith Welding Torches.

### C. SORENSON

18 E. Sixteenth St. Chicago

### Absolutely Guaranteed Welding

We absolutely guarantee all work done by the  
OXWELD PROCESS of welding and cutting, in-  
cluding welding cracked or defective cylinders,  
crankshafts, housings, aluminum crank and  
transmission cases, etc., etc. Estimates fur-  
nished on job and contract welding and cutting  
of all kinds.

### OXWELD ACETYLENE COMPANY

36th St. and Jasper Pl., Chicago, Ill.

### Oxy-Acetylene Welding, Automobile and Machinery Parts

### WELDED AND MACHINED

Cracked Cylinders a Specialty

### ADAPT MACHINERY CO.

1624 Wabash Ave. Chicago, Ill.

### WE DO WELDING

others cannot do on parts of aluminum or cast  
iron. Expert auto repairmen dismantle and re-  
assemble jobs. Ship your worst smashed crank-  
cases and cylinders to—

**HOBBIE'S WELDING PLANT, Hampton, Iowa**

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via New York as an advertising car. Sixty days  
each way; sixty days on the Pacific coast. Ad-  
vertisers that are interested in advertising that  
will be worth while, communicate with me.

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### WE SPECIALIZE

In placing and supplying High Grade Technical  
men in all branches of the Automobile Industry.

### THE TOLEDO ENGINEERING AGENCY,

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### DOES ADVERTISING IN MOTOR AGE

Clearing House columns bring results? Note  
preceding pages.

A Trial Order Will Convince You

**MOTOR AGE, 900 Michigan Avenue, Chicago**



### UZUM

Is it worth anything to you to be able to

**Wash Your Hands  
Without Water**

When you are out on a trip in your automobile.  
If your dealer does not carry UZUM send us 15c  
for full size can. We pay mailing charges.

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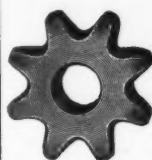
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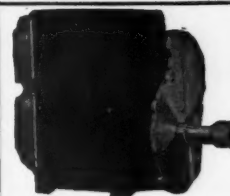
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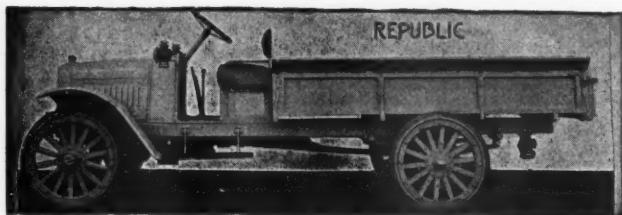
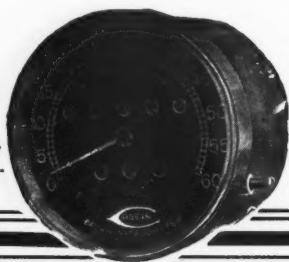
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are manufactured from new and improved patterns, allowing a long overlap on the tread.

Our patented watershed construction insures absolute protection.

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Made in all sizes and styles.

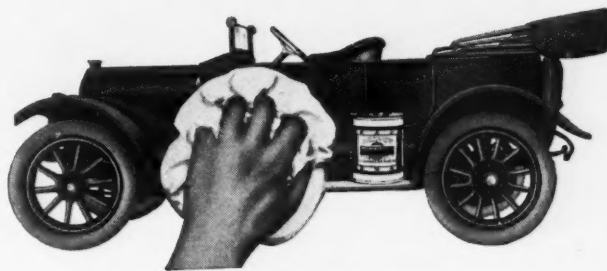
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A GREAT PLUG  
A GREAT QUALITY  A GREAT SERVICE



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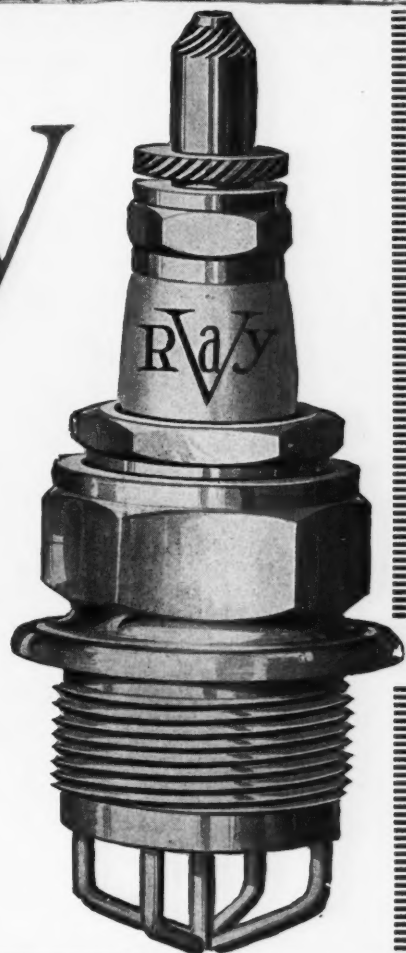
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**THE CUSTOMER COMES BACK  
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